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# The AUTOMOBILE



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VOL. XXX NEW YORK—THURSDAY, APRIL 2, 1914—CHICAGO No. 14

The AUTOMOBILE

# England Opens Museum for Historic Cars

## Permanent Exhibition Installed in Two Courts of the Crystal Palace at London

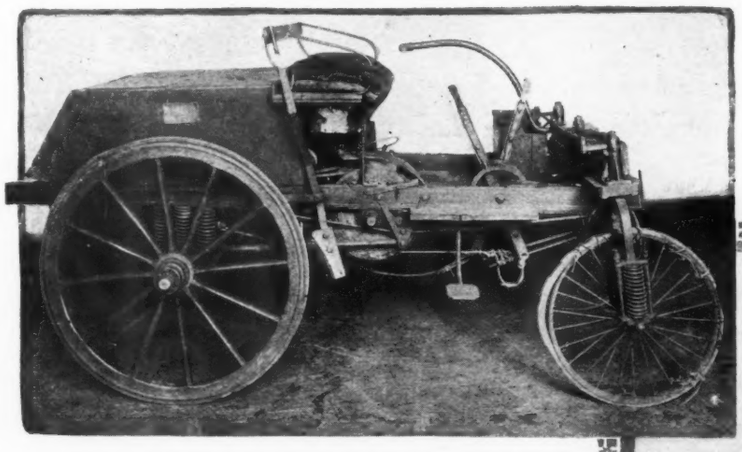


Fig. 1—An early kerosene car—The Knight, built in England in 1895

Fig. 2—Panhard 1897 model, the first one with wheel steering

HAS there ever been a movement that has made such progress as that associated with the motor car? The automobile—in its modern form is only about 20 years of age, indeed, it was only on the 14th of November, 1896 that it became legal for automobiles to be used on roads of the United Kingdom, yet the pioneer vehicles are already so antiquated as to necessitate a museum. France and Germany have already small collections of historical vehicles, they being located in Paris and Munich—the latter possessing the original Gottlieb Daimler and Carl Benz gasoline vehicles, built about 1885. In Great Britain there have been many suggestions that such a museum should be formed and 4 years ago, an excellent collection of early machines was got together and displayed at the Imperial Exhibition at Shepherd's Bush, London, in 1909. Unfortunately, however, the display was allowed to be disbanded, many of the old cars being now lost forever.

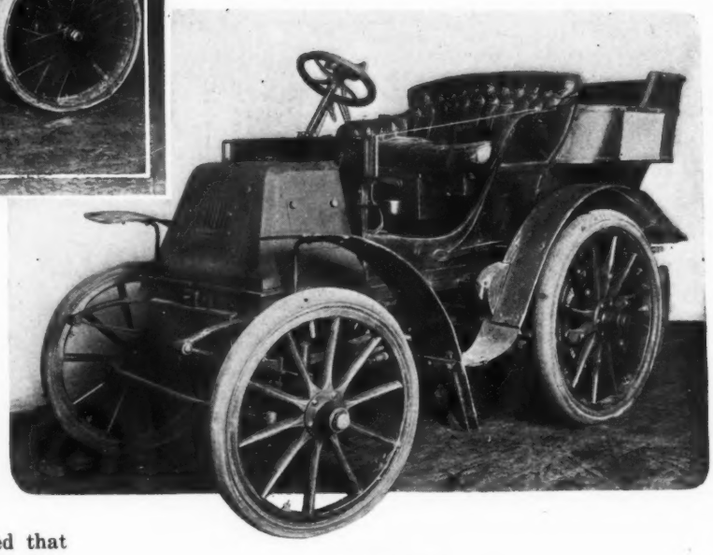
Fortunately, the matter was again taken up and this time in earnest, about 2 years ago. While not so extensive as the first one, it is still of a very complete and instructive character. The question of finding a permanent home for the collection was a difficult and protracted one. Indeed, it has only lately been settled, arrangements having been made to house it in two Courts of the well-known Crystal Palace, near London. No more suitable location for the historical machines could be found, as not only was one of the first automobile exhibitions in the United Kingdom held there, but many of the early reliability trials, which did so much to extend the use of the motor car in the early days, were held in the Palace as the start and finishing point of the daily runs.

The motor museum was inaugurated on Thursday, March 12, by H. R. H. The Duke of Teck, who, on behalf of the trustees, officially handed the collection of historical motor cars and cycles, over to the care of the trustees of the Crystal Palace, which is about to practically become the property of the nation. The Duke was supported by a number of well-

Fig 3—Upper—Star dog cart, built in 1899. The motor is hung in the rear

Fig. 4—Middle—English Daimler, 1899 model. Note that the engine is under the bonnet, and a gearbox amidships drives the jackshaft

Fig. 5—Lower—English steam tricycle, patented by Sir Thomas Parkyns in 1881. It was made by Arthur H. Bateman, London



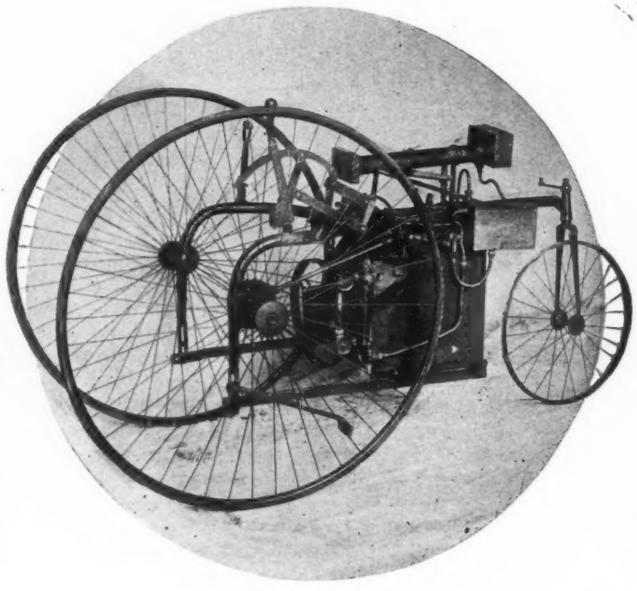
known British motorists, among them being such pioneers as Sir David Salomons, who organized the first exhibition of automobiles in Great Britain at Tunbridge Wells, in October, 1895; Col. R. E. Crompton, who built a steam car in the sixties of the past century and Col. Holden, who constructed a four-cylinder motor cycle as long ago as 1895.

Space will not permit a full description or even a mention of all the vehicles in the collection which comprises examples of all types of automobiles—steam, gasoline and electric, but attention may be quickly drawn to a few of the more important vehicles to be seen. It may here, also, be mentioned that while there is no example of an early American gasoline car in the Museum, the United States is represented by two steam cars—a Foster, built at Rochester, N. Y., and a White, from Cleveland, and an electric car built by the Cleveland Machine Screw Co.

**Oldest Relic is Steamer**

The oldest relic to be seen in the museum is the remains of steamer, the construction of which was commenced by Col. Crompton, when still an engineering apprentice, in 1861. It was designed to carry from four to five persons, had a water-tube boiler, three-point suspension, chain transmission and other features of modern motor cars, it being the first road vehicle to be fitted with a differential gear. The machine was taken to India and was not completed until 1869, after which it ran for several years. A steam tricycle, Fig. 5, built by Mr. Arthur Bateman of Greenwich, Eng., in 1880-81 becomes next in order of date, this being followed by a gasoline car, Fig. 12, constructed in 1892 by Mr. F. Bremer of Walthamstow. The vehicle which is hardly any bigger than the egg-boxes on wheels that many small boys delight in constructing, has a horizontal engine, fitted with coil and accumulator ignition, the transmission being by belts and chains.

The early, but not the earliest work of the late Herr Gottlieb Daimler, who, with Herr Carl Benz are the undoubted pioneers of the modern automobile, they working unbeknown to each other, but within a relatively few miles of each other, in Germany in the early eighties, is exemplified by a Canstatt-Daimler of 1894-5. Although the vehicle bears no resemblance whatever to the modern Mercedes which emanates from the same factory, it is interesting as being one of the first to be fitted with the gate controlled form of change-speed gear. The engine, a vertical twin-cylinder, is located at the rear of the vehicle in a cupboard, the ignition is by means of the defunct hot-tube.



There are several examples of the motor productions of the year 1895, among them being the Kerosene car, Fig. 1, built by Mr. J. H. Knight, of Farnham, a notable feature of which is the coil spring suspension, which has outwardly at least, the appearance of the modern shock absorber. The vehicle, which was originally a three-wheeler, is fitted with a horizontal, single-cylinder engine, 3 1-2-inch bore and 6-inch stroke, the transmission being by belts. Nearby is the first car built by the Wolseley Co., which has since developed into one of the principal automobile building concerns in the United Kingdom. The machine, which was produced in 1895,

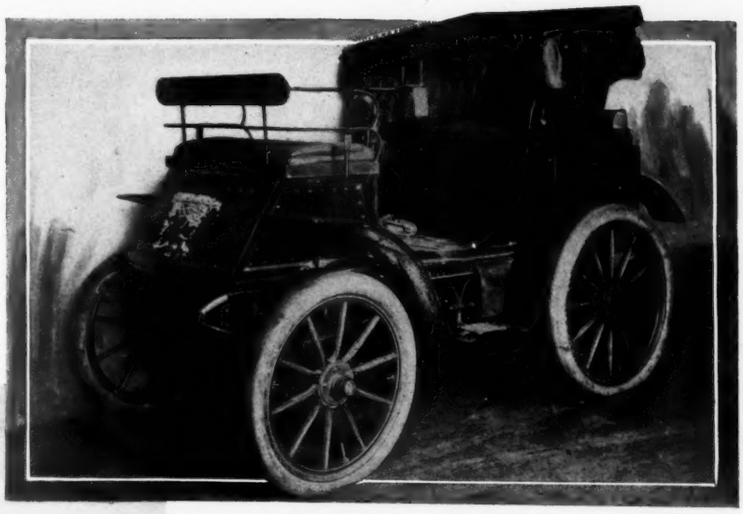
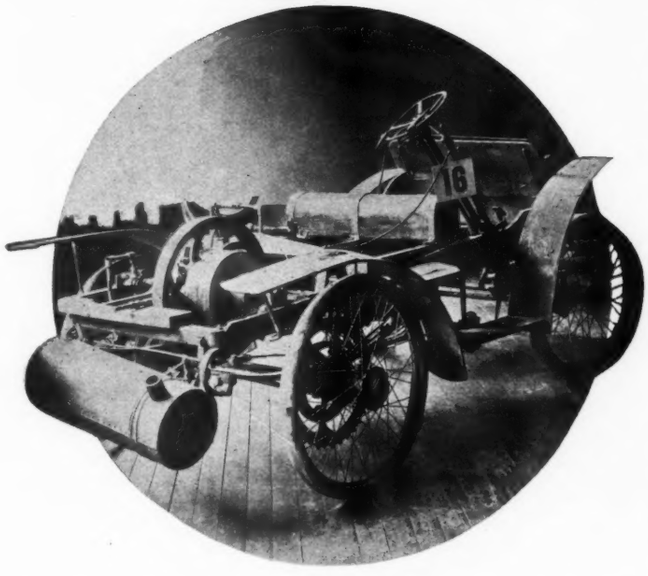


Fig. 6—Upper—A Gardiner-Serpollet, an early steam car. This was one of the first of a famous line of steamers

Fig. 7—Middle—A Clement car built in France in 1897. Note the sloping hood and wheel steer

Fig. 8—Lower—Remains of a Benz car of 1899. It was found abandoned in a copse. A feature is the large muffler hung in the rear




is a three-wheeler, with a tubular frame, and seats for two persons sitting back to back. Interesting features of the machine are the gate-controlled change speed gear, and the two horsepower engine which comprises two horizontal cylinders with a common combustion chamber, the cylinders being arranged one side of the chassis and the flywheel on the other.

The work of the year 1896, is indicated by the first Lanchester (British) car, Fig. 13, which has a twin-cylinder horizontal 8 horsepower engine, fitted with governor, and low-tension coil and accumulator ignition. The speed-change gear is of the epicyclic or planetary type, while the back axle is worm driven, the Lanchester being the pioneer of the worm drive as applied to automobile construction.

The chassis has a tubular steel frame; c back springs are employed, and a unique arrangement of transverse semi-elliptic front spring. The body is of composite steel tube and steel plate, sheathed with polished wood. Tiller steering was originally embodied, with hand-lever control, but wheel steering was subsequently fitted. Special attention is directed to the wick carbureter. This characteristic form of vaporizer is retained in present-day Lanchester cars. This vehicle was capable of an average speed of about 12 miles per hour, and it had a maximum speed of only 17 miles per hour.

The most notable run made by this vehicle was from Birmingham to Oxford and back, and a non-stop run from Birmingham to Tewkesbury and back.

Another 1896 model is one of the Bolleé voiturettes, the single rear wheel of which was so arranged that it could be moved bodily forward a sufficient distance as to allow the driving belt to run slack, this taking the place of the modern clutch, to disengage the engine from the transmission.

**Direct Drive on Clark**

Another interesting development of the year 1896 was the Clark bicycle wheel and engine, Fig. 9. The engine is a "side-by-side" two-cylinder, driving the axle of the wheel direct. The size of the cylinders is 2 3-4 inches by 6 inches bore and stroke. The exhaust valves are horizontal, and worked by rockers from a connecting rod, this being driven from a large cog-wheel forming part of the two-to-one gear. The inlet valves are automatic. The cylinders have open ends, and the combustion heads were probably water-cooled. The ignition is by incandescent tubes. The motor speed was controlled by lifting the exhaust valves. Geared direct to engine, the machine ran 35 miles per hour on the level, but it would not climb any hill.

The 1897 cars include the second Wolseley, which was still a three-wheeler, but a great improvement on its predecessor, the second Lanchester, which also marked further progress; an Arnold-Benz, a British copy of the Benz 3 1-2 horsepower belt-driven car, once the most popular of all; a Panhard, a Clement, and one of the first motor-cabs ever put on the road. The Panhard on view, Fig. 2, is not one of the earliest of this old-established French firm, for it comprises many improvements on the original vehicles, notably wheel steering and electric ignition, in place of the original tiller steering, and firing by incandescent tube.

The centrifugal ball governor was so arranged as to throw the bottom of the tappet rods out of engagement with the

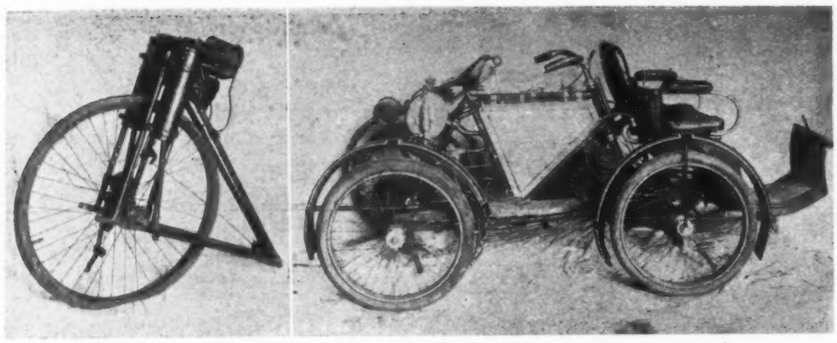


Fig. 9—Left—Clark bicycle wheel, built in 1895, directly driven by a two-cylinder engine. The machine was capable of 35 miles per hour

Fig. 10—Right—Ariel, made in 1900. It had a 3-horsepower, water-cooled engine

cam mechanism, so that the exhaust valve, being thus prevented from lifting, a further charge was not taken into the engine, and consequently its speed was soon reduced.

The method by which the changes of direction and speed were obtained on this type of car was by means of double slidable bevel wheels on the differential cross shaft, so that if one had three speeds forward, one likewise had a choice of three speeds backwards, as the bevel gearing was moved over bodily to engage with the driving bevel gear, the resultant thrusts being taken by means of special thrust bearings.

The year 1899 is represented by, among others, the first Star (British) car, another copy of the Benz of that time; a Renault tricycle with horizontal engine; a Turgan (French) car, the crankshaft of which is in a vertical plane and drives a horizontal flywheel, and the first Argyll (British) car. Although only fitted with a single-cylinder engine of 3 1-2 horsepower, that little car has, except for the tiller steering, every feature of a modern car—clutch, gearbox, universally jointed propeller shaft, and bevel-driven back axle. The British Daimler, Fig. 4, of the period is represented by a car of 1899 construction, this following closely on Panhard lines. Curious features, from a modern point of view are the separate lever for the reverse, and the mounting of the float chamber of the carbureter on the dash.

**Daimler Engine Under Bonnet**

The engine is in the normal bonnet position, and drives through a gearbox of large dimensions to cross shafts and thence by roller chains to the back wheels, which are, it will be noted, of large diameter. This last feature made for easy running with these early models. The power of the engine is reputed to be 6 horsepower.

It will be noticed that the valve gear, which is controlled by a hit and miss form of governor, provides for mechanical operation of the exhaust valves, while the inlets are atmospheric. The original tube ignition fittings are still in position.

The carbureter is a simple arrangement, with the float in position on the dashboard. The contact maker, chain driven from the camshaft, is situated in a convenient position on the dashboard.

In the Star dog cart, of 1899, Fig. 3, the motor was situated in the rear under a sort of hood. Lightness of parts, even in those days, was considered (though not much, perhaps), and the crankcase being constituted of ordinary air at (approximately) atmospheric pressure, did not add materially to the weight of the chassis. To the right of the flywheel are two belt pulleys, one large and one small, which, by means of crossed belts, transmit the drive to the fast and loose pulleys on the countershaft, which is beneath one's feet. The fixed pulleys are connected to the plain and unprotected differential gear, which is mounted inside the pulleys in question. From here the drive is conveyed to the rear road wheels by chains and sprockets.

The most interesting of the 1900 representatives are a Gardiner-Serpollet steam carriage, Fig. 6, a Sturmey cyclecar, Fig. 11, fitted with a 2 3-4 horsepower air-cooled engine—this being the first known attempt to build a car for $500—and the electric car already alluded to as having been built by the Cleveland Machine Screw Co., of Cleveland. The exact date of this machine is not known. It is stated to have been constructed to the design of Mr. Sperry, a feature being that the tiller that controls the steering, also, by a vertical movement, operates the speed controller.

The Sturmey was probably the first car to use an air-cooled motor-bicycle engine. One of 2 3-4 horsepower was the largest procurable at that time, but the provision of a three-speed reducing gear enabled it to tackle hills. This gear is an epicyclic gear, with a single train of wheels, and it was the first gear of this type to be employed on a car, and the first planetary three-speed gear to be fitted to a motorcar, while it may not be uninteresting to mention that its invention led up to the subsequent invention of the Sturmey-Archer three-speed gear, so widely used on pedal-cycles today.

The engine shaft and the gearshaft are parallel, set across the car and connected by a pitch chain, through the medium of a foot-operated cone clutch; the final drive is by single

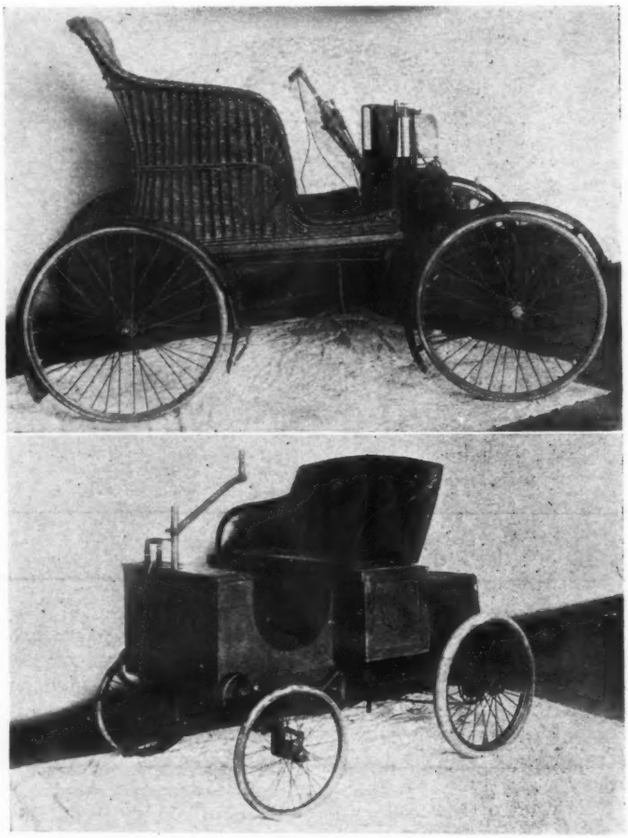


Fig. 11—Upper—This is believed to be the first cyclecar. It was built in 1900 and was designed to sell for less than $500

Fig. 12—Lower—The English Bremer car made in 1892. It had a horizontal engine and a belt and chain transmission

chain to the differential on the back axle—a true direct drive. This live axle was adapted from that of a tricycle, and was one of the first axles of this type to be fitted to a car.

A peculiarity will be noted in the main frame of the chassis, being spring-mounted only in front, the body portion being separately sprung, being supported on C springs at the rear, resting on the back axle, the body frame being hinged to the main frame just at the back of the dashboard. The body is of basket-work, and is possibly the first basket-work body fitted to a car.

The cyclecar of today bids fair to be one of the fastest things on wheels. This early cyclecar made no such pretence. "Big" cars did 20 miles per hour "on the top," and went down to a low gear on every rise. This car did 15 miles per hour, and its designers were satisfied. It would take a 1-in-8 grade on its "first," but, then, one had to stop to cool the engine, which got so hot that it went on firing when the spark was switched off.

The Ariel quadricycle, Fig. 10, built in 1900, was also made in tri-cycle form. The 3 horsepower engine has a water-cooled head. It can be run free, or transmit the power through either of two reducing gears. The lever on the right handlebar lifts the exhaust valve, which is one method of control.

The surface carbureter is built into the triangular petrol tank carried in the frame. There is gravity feed to the carbureter space, controlled by a positive needle valve; the air intake is down a tube from the top of the tank, and the level of the petrol in the lower carbureter portion is indicated by a wire carried upon a float.

**1900 White on View**

The most modern exhibits in the museum are those of 1901, and include a Foster steam car built at Rochester, N. Y., a White steam car from Cleveland, O., which belonged to Col. Crompton, and on which he covered over 50,000 miles, and a Delahaye (French) car, which is notable for the fact that it is fitted with a self-starter. There are many other interesting vehicles in the collection that might advantageously be described, but sufficient has been written to indicate that the motor museum is full of interest.

The need for such a museum cannot be questioned, and it is safe to say that one can spend many a profitable afternoon in a careful study of these early vehicles, the struggles, and the worries associated with which have resulted in the silent-running reliable automobile of today.

It has been suggested that a similar collection of the types which marked the infancy of the industry in which the United States now stands supreme, might well be brought together in this country. The material is not lacking. Already in the Smithsonian Institution in Washington one of the earliest practical American motor cars—dating from 1893—is on view, and last month in Indianapolis a number of models from ten to fifteen years old made an interesting section of a manufacturers' parade.

Let us hope that the United States, the leader in the industry, will not be slow to follow England's example and preserve the early machines for posterity.

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## Tragedy in the Distribution of Road Cost

WHERE the cost of road building and maintenance is to be borne largely by local assessment, the most active and powerful opposition to the enterprise is frequently silent in public for lack of organization or a spokesman. Lloyd George referred in the British Parliament to a class of people among these opposing forces who, he considered, had a real grievance, which it would be good policy to recognize and remove, if only for the sake of simple justice. According to *The Auto* he said in substance:

"By means of large motor vans the great stores of the larger towns now do a large amount of retail trading up to fifty miles, and even more, from their seat of business. Certain households buy almost all their goods from them. Telephones and gasoline motors have completely transformed this situation from what it was. The amount of damage these vans do to the roads is prodigious, and I cannot think of anything more unjust than that a local trader should have his highway rate doubled in order to maintain people who are taking away the whole of his business. It is not merely the amount the local trader has to pay, but I should have thought the injustice of the thing would have burned into him."

What really should have burned into the local dealers whose business is affected as badly as referred to, is the need of getting into a new business more in consonance with the modern conditions or of cooperating mutually for the defense of the old stands; for example, by investment in a motor van adapted for serving the needs of the locality better than the city merchant can afford to do so long as he has not garnered the whole local trade. It is unfortunate for the backward country merchant that he is hit twice—once by new competition, and, secondly, by a tax which may be traced to the same new factor in civilization which caused the competition, but this misfortune is a tragedy rather than an injustice. He is not taxed for highway maintenance as a trader, but as a member of a community. In England the situation furnishes a good argument, however, for revising the laws according to which the burden of road building and of maintenance is mainly local and placing the burden, instead, upon the Imperial exchequer, as now proposed, the proposition going much farther with regard to main roads than the American system of distribution of the cost among municipal, state, and Federal governments.

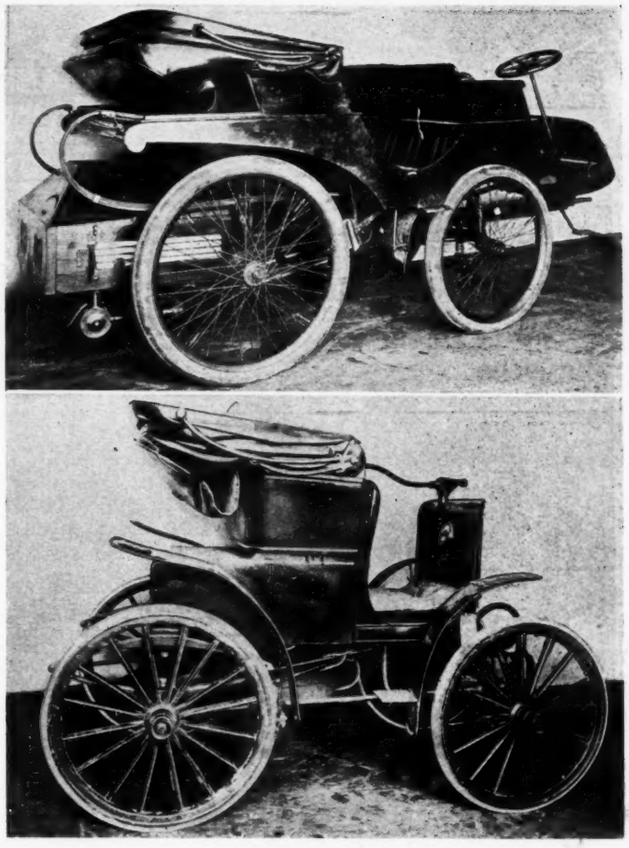
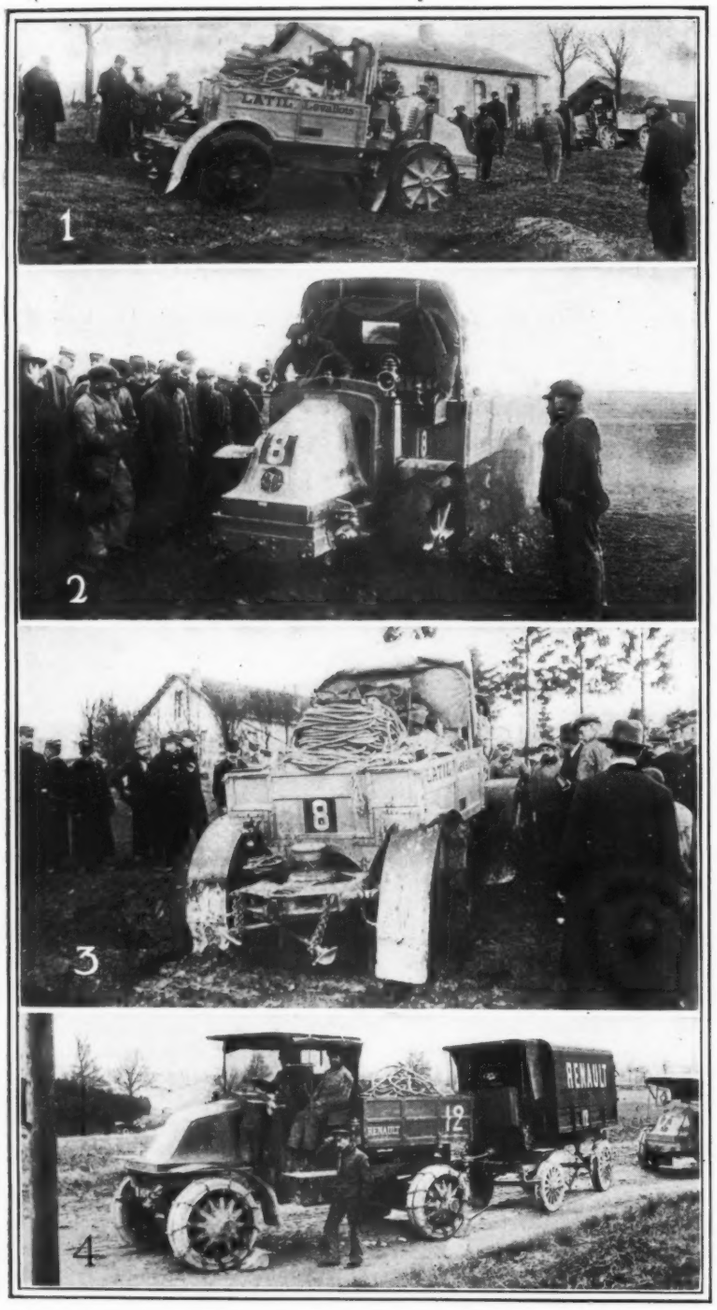


Fig. 13—Upper—An 1896 model Lanchester six-seated phaeton. It had an 8-horsepower, air-cooled motor and a planetary gearset

Fig. 14—Lower—The electric car built in 1901 by the Cleveland Machine Screw Company

# Tractors Show Durability in Tests

## Four-Wheel Drive Types Demonstrate Practicability—Light Vehicles Make Best Showing




**Four-Wheel Drive Tractors in Army Tests**

1—One of the Latil four-wheel drive tractors going across country in the tests conducted by the French army officials to demonstrate the practicability of this type of vehicle under all sorts of conditions

2—Another of the three Latil tractors taking part in the trials. The illustration gives a very good idea of the difficulties the tractors were subjected to in the course of the recent tests

3—When the four-wheel drive tractors struck soft ground they often sank in so that they had to extricate themselves with the aid of their capstans, tackle, etc. Above is shown a Latil in a soft spot

4—The trailers which the tractors drew were not featherweights by any means. Above is shown a Renault tractor with one trailer negotiating a considerable grade during the French army trials

LAST week we described the four makes of four-wheel drive tractors which the French army had arranged to test out over the soft roads and fields of France. This week we are enabled to reproduce photographs showing all four of these tractors in their actual road work, which was carried on under the most unfavorable conditions, rain falling incessantly for several days. The test so far demonstrates that the heavy division of tractors carried too big loads for the soft mud which in some cases was 12 inches deep.

In addition to demonstrating their ability to go through fields, to climb hills, etc., the test included fuel economy, and over medium roads the light weight vehicles averaged 3 miles per gallon with their trailers and the heavy tractors ranged from 1 1-2 to 2 miles per gallon.

To date there has not been a single case of mechanical failure in these four-wheel drive vehicles, but for mid-winter use on soft ground the loads will have to be reduced. The report of the test to date follows:

PARIS, March 21.—Intending to adopt four-wheel drive tractors for the artillery service, particularly for hauling heavy guns and ammunition wagons, the French authorities have put these vehicles to the most severe test ever imposed on machinery and men. After having had their chassis examined and sealed the tractors set out from Rheims for Chalons, a distance of 37 miles. The competitors were two Panhard-Levassor with Knight motors, two Panhard-Levassor with poppet-valve motors, two Renault, two Schneider, and three Latil tractors. All the tractors hauled two trailers. The Panhard-Knights and one of the Latils were entered in the light class of tractors, total weight, comprising tractors and trailers, being about 16 tons; all the others were in the heavy class, total weight being 22 1-2 tons.

### The First Day's Run

The first day's run passed off without incident, the route being laid over main roads, on which it was possible for the tractors to haul their two trailers without great difficulty. The machines had to be sent away in a haphazard manner, for their respective speeds were not known. Chalons was reached in the following order: two light Panhards, light Latil, heavy Latil, two heavy Panhards, two heavy Renaults, two heavy Schneiders, and heavy Latil. The journey was made at an average speed varying between 5 1-2 and 6 3-4 miles an hour. The minimum speed required by the regulations was 5 miles an hour. Some difficulty was experienced in getting the vehicles into the barracks yard at Chalons. The entrance is up a 6 per cent. roughly paved gradient covered with a thick coating of mud. It was necessary to lock the differentials and in some cases to put down sand before this could be climbed.

Some of the tractors had to attempt the climb several times.

Real difficulties began on the second stage from Chalons to Bar le Duc, a distance of 43 miles. Soon after leaving Chalons the main road was abandoned for an old Roman road with a soft surface, thickly coated with mud, and so narrow that it was practically impossible to pass. To add to the difficulties, there were gradients varying from 8 to 12 per cent. The two light Panhard tractors, with Knight motor, and the light Latil, sent away at 8 o'clock, reached Bar le Duc at 3.30 in the afternoon. Most of the heavy tractors were obliged on several occasions to leave a trailer at the foot of a hill and after going up with one come back for the other. The heavy Latils and the Renaults came in very late; one Schneider reported at 7 o'clock and a second one did not finish its journey until midnight. The conditions were such that the committee found it necessary to modify the route towards the end, abolishing the test through a specially prepared track of 12 inches of mud.

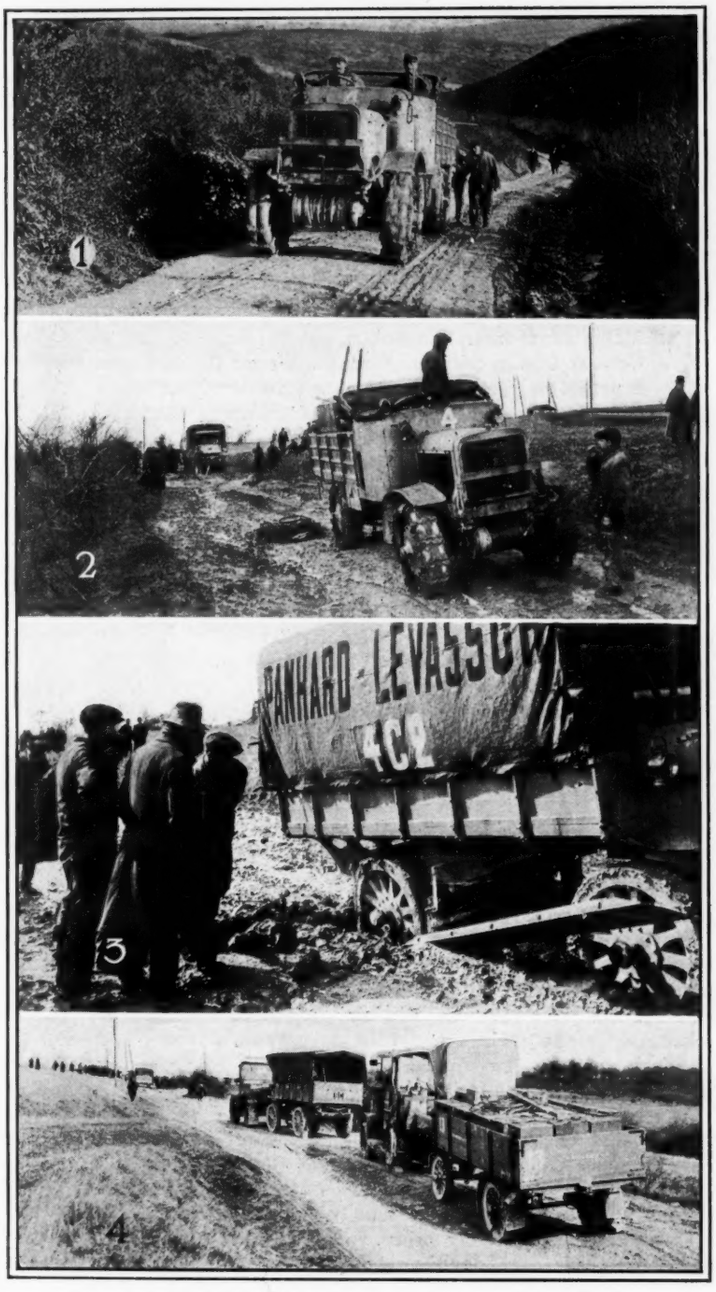
### Test of Capstans

On the trip from Toul to Thiaucourt, a distance of 37 miles, a special test was made of the motor-driven capstans. Each machine had to climb a hill having a gradient of 9 to 10 per cent. as high as was possible with two tractors in tow, then, when the motor stalled, the tractor went to the top alone and hauled its trailers to the top, singly or together, by means of the capstan. These tests occupied the whole of the afternoon, during which time the light Panhards, both the Renaults, a heavy Panhard and a light Latil, climbed the hill. At darkness the trials were postponed until a future date.

The real hill climbing test was planned around Verdun, for a distance of 40 miles. It was the most severe test to which machines and men had been subjected. At the last moment it was found necessary to change the route, it having been discovered that some of the bridges were only guaranteed for a load of 5 tons, whereas many of the tractors scale 7 1-2 tons. Although it rained heavily throughout the day and the roads were soft tracks just wide enough for one team, the morning's program passed off satisfactorily. Immediately after lunch No. 1 light Panhard became embedded in the mud on a difficult turn. It was extricated with some difficulty, then began the 12 kilometers hill climb through the Tranchee de Calonne, reaching Verdun soon after dark. This hill test proved disastrous to many of the tractors. It was practically a cross country track in which the vehicles sank until their axles rested in the mud. Picks, shovels, planks and ropes had to be brought into use. One of the Schneiders, starting last on this climb, covered a little more than a mile between 11 a. m. and 5 p. m. A heavy Panhard and a heavy Latil reached Verdun at 10 p. m.; the first of the Schneiders did not check in at headquarters until 11 o'clock, while the Renaults, a Schneider and one Latil spent the whole night on the road, coming in between 5 and 6 o'clock next morning. At Verdun tests were made in climbing over such obstacles as fallen trees, banks of earth with a gradient of more than 17 per cent., and in traveling over soft muddy ground.

As some of the drivers had been on the road for two periods of 24 hours each, it was decided to shorten the sixth day's run to 28 miles. Rain again fell throughout the whole of the day, but the distance was covered in a fairly satisfactory manner at an average speed of 6 to 7 miles an hour by all the vehicles. Heavy rain marked the seventh stage, a distance of 38 miles, during which braking tests were carried out on an 8 per cent. gradient. No. 12 Renault, when being passed by another train, had its projecting hubcap caught by the rear wheel of the last trailer, with the result that the steering gear was damaged.

A further hill climbing test was carried out on the Montmedy-Charleville stage. The first part of the hill had a gradient of 13 per cent., with a good surface covered with a thin layer of mud. The second portion of this hill had a gradient of 13 1-2 per cent., a difficult turn, and a very poor surface. A Renault, a Schneider, a light and a heavy Panhard and a light and a heavy Latil climbed the first part of the hill all of them using non-skid chains on all four wheels. No vehicle was capable of climbing the second portion.




1—One of the Panhards pulling up a long, difficult grade
2—A big Panhard preparing to haul trailers with a capstan
3—One of the Panhards embedded in mud on a bad road
4—Schneider tractors pulling up a long, muddy hill

# Revoking Licenses a Check on Drivers

## Nine States Revoked 184 Drivers' Licenses During 1913 and Suspended 374 Operators of Motor Cars—Massachusetts the Leader in the Movement for More Careful Driving

By J. Edward Schipper

THE Bay State insists on having careful drivers. Up to October during the year 1913, more than 400 had been deprived of their right to use the roads of the state. Out of the exact total of 432, there were 146 who had their licenses permanently revoked and 286 who had them suspended for terms of various lengths.

Connecticut, without large cities of the class of Boston, follows closely on the heels of her New England sister. During the same period in this state eighty-four drivers had their privileges suspended. No licenses are revoked in Connecticut, but instead it is the custom at the office of the Secretary of State to either suspend the license for a definite period or to suspend it indefinitely.

Maryland has revoked twelve licenses, New York ten, Rhode Island five, New Hampshire and Vermont each four, District of Columbia two and Maine one. The other states have either no laws which empower the Secretary of State or some other officer to revoke the licenses of the drivers, or, they have no cases on record where it has been deemed necessary.

### No Special License Required

Through the less populated states those who operate motor cars are not required to have a special license and hence there is no record of cases where people are forbidden to drive their cars on the highways.

Other states are less vigorous in the prosecution of drivers who operate their cars while in an intoxicated condition or otherwise handle their vehicles in a reckless manner, and although they have a provision in their laws for revoking licenses, they do not use it.

The tabulation, page 723, showing the number of licenses revoked and suspended shows that the New England states have been most active in this method of repressing dangerous driving. Massachusetts has used this method for removing from the highways persons considered dangerous, to a larger extent than any other state. The Massachusetts law distinctly provides for the revocation of the license in the following cases:

1.—Upon a third conviction in the same calendar year for having exceeded the legal rate of speed.

2.—For any cause which may render the user of the car incompetent to drive it in the eyes of the Massachusetts Highway Commission.

3.—After any accident in which a person is fatally injured. It is of course in the power of the commission to reinstate should the incident be purely accidental.

Before revoking or suspending any licenses it is customary for the Commission to make an investigation into the particulars of the case. The law renders the revocation of the license in the event of three convictions for speeding entirely automatic. It is in the power, however, of the Massachusetts Highway Commission to revoke a license for any reason they see fit.

In Maryland the Commissioner of Motor Vehicles has the power of revoking any license for any reason that he deems fit. The user of the car, however, who feels he has been unjustly treated is allowed by law to make appeal to the governor. The Maryland law in regard to the use by the Commissioner of his privilege of discontinuing licenses provides that he shall give at least 3 days' notice to the defendant and shall then hold a hearing where the defendant is given a chance to show cause why his license should not be revoked.

In New York it is within the power of the Secretary of State to revoke the driver's license upon the third conviction for speeding, for operating a motor vehicle while in an intoxicated condition and for going away without stopping after an accident to give his name and address to the injured person or to the police. The law provides that the Secretary of State shall suspend the license of a chauffeur or owner upon recommendation of the trial court. The defendant then has the right of appeal, but if the appeal is not taken, dismissed or the judgment affirmed, the Secretary of State is required to revoke the license. It is within the powers of the secretary to renew the license after a hearing on the subject but in the case of a revocation after a third conviction for speeding, the license cannot be renewed for 6 months.

Rhode Island has revoked five drivers' licenses, suspended four for various periods and in addition to this has refused to grant the applications of four operators' licenses.

### Reckless Driving Responsible

Reckless driving and excessive speeds and driving while under the influence of intoxicating liquors have been the two causes for the revoking of licenses by the automobile department of the State Board of Public Roads. The causes for the suspensions in official parlance were in all four cases due to "Improper operation of an automobile," this being the official phrase for reckless or careless driving. Refusal to grant the applications for license was due to the previous improper or reckless operation of an automobile by the applicants.

Before revoking or suspending the license of an operator it is the custom of the State Board of Public Roads to make a thorough investigation into the circumstances. It is also the custom of the board to make an investigation into the causes of all serious accidents occurring on the roads of the state. The Rhode Island law requires that in all cases of revocation or suspension a hearing on not less than 3 days' notice shall be given to the respondent.

### Intoxication a Leading Cause

New Hampshire, which has deprived four persons of their driving rights, has done so because three were intoxicated while at the wheel of the car and the fourth for reckless driving. The fourth case mentioned was rather unusual because the Secretary of State used his right to deprive the driver of his license without having the case come to him through the police courts in the usual manner. In the other three cases the parties had pleaded guilty of driving while intoxicated. In Vermont the story of New Hampshire is duplicated. Three drivers' licenses were taken away because of driving while intoxicated and the fourth for reckless driving. In this state the matter is investigated by the state's attorney of the county in which the offense was alleged to have been committed.

The District of Columbia has on record two cases in which the licenses of drivers have been revoked. Both of these were because of violation of the police code section which provides that the commissioners of the district shall have the power to suspend or revoke the permit upon the recommendation of the police authorities and upon evidence sufficient in the opinion of the commissioners. The state of Maine has on record one case in which a driver's license was revoked for drunkenness which caused a bad accident.

In recent years the law has come to be regarded as a means of preventing crime rather than of punishment. By the use of the power of removing from the highways those who are a menace to the safety of others, a step in the direction of the proper use of the law has been made by any secretary of state. Where a body of men come together and decide after a hearing of the defendant's case that a certain driver is apt through his failings to endanger the lives of others using the roads of the state, it is time to revoke the license. It is better to keep an irresponsible man away from the wheel of a car than to fine him or imprison him later.

Following are extracts from the laws of the states which enforce the provision referring to the revocation of the drivers' licenses:

**Connecticut—Secretary's Power Absolute**

The secretary may suspend or revoke any certificate of registration or any license issued to any person under the provisions of this act, with or without a hearing, for any cause which he may deem sufficient, and may order such certificate or license to be delivered to him whenever he has reason to believe that the holder thereof is an improper or incomptent person to operate motor vehicles, or is operating improperly or so as to endanger the public; and neither the license nor the certificate of registration shall be re-issued unless, upon investigation, said secretary determines that the operator may again be legally permitted to operate.

**District of Columbia**

It shall be a condition of any permit granted as above, that the applicant agree that the Commissioners of the District of Columbia shall have the right to suspend or revoke the permit upon the recommendation of the major and superintendent of the metropolitan police force and evidence submitted by him sufficient in the opinion of the Commissioners of the District of Columbia to prove that continuance of the permit is a menace to public safety.

**Maine—A $50 Fine**

Any person operating a motor vehicle upon any way, recklessly or while under the influence of intoxicating liquor so that the lives or safety of the public are in danger, or upon a bet, wager or race, or who for the purpose of making a record, thereby violating the speed regulations and who knowingly goes away without stopping and making himself known after causing injury to any person or property, or who uses a motor vehicle without authority from its owner, shall be punished by a fine not exceeding $50, or by imprisonment for a term of 3 months, or by both such fine and imprisonment, and if any person be convicted the second time for violation of this section, he shall be punished by a fine of $100 or by imprisonment for a term of not less than 6 months, and not more than a year. On conviction of violation of this section, the license of the person to operate so convicted shall be revoked immediately. And if the person so convicted is the owner of a motor vehicle, or has control of any motor vehicles as a manufacturer or dealer, the certificate of registration of all motor vehicles owned or controlled shall be revoked.

**Maryland—Commissioner's Power Full**

The Commissioner of Motor Vehicles may, after due hearing, upon not less than 3 days' notice in writing, said notice to be sent by registered letter to the address given by the operator when applying for license certificate, which shall constitute sufficient form of notice, suspend or revoke the operator's license issued to any person under Section 137 of this subtitle, for any cause which he may deem sufficient; but every applicant for an operator's license whose application shall be refused by said commissioner and every licensee whose operators' license shall be suspended or revoked by said commissioner may appeal to the governor of this state from such decision, refusal, suspension or revocation, the decision of the governor to be final, and such appeal not to operate as a stay of such order or decision by the commissioner.

**Massachusetts—Law Very Broad**

Upon a third or subsequent conviction in the same calendar year of a violation of section sixteen, or of section seventeen of this act the commission shall forthwith revoke the license of the person so convicted, and no new license shall be issued to such person for at least 30 days after the date of such conviction, nor thereafter, except in the discretion of said commission.

The commission may suspend or revoke any certificate of registration or any license issued to any person under the provisions of this act, after due hearing, for any cause which it may deem sufficient, and the commission may suspend the license of any operator or chauffeur in its discretion and without a hearing, and may order the license to be delivered to it whenever it has reason to believe that the holder thereof is an improper or incompetent person to operate motor vehicles, or is operating improperly or so as to endanger the public; and neither the certificate of registration nor the license shall be reissued unless, upon examination or investigation, or after a hearing, the commission determines that the operator or chauffeur should again be permitted to operate.

The commission, under the same conditions and for the same causes for which it may suspend or revoke any license issued by it, may also suspend the right of any non-resident of Massachusetts to operate motor vehicles in this state until he shall have received a license from the commission; and the provisions of section twenty-one of this act shall apply to any such person who operates a motor vehicle in this state after notice of such suspension has been issued and received by him or by his agent or employer.

Every such officer upon the request of the commission, shall demand forthwith the license of any operator and the certificate of registration and number plates or seal of any motor vehicle situated within the limits of the city or town where such officer resides when said license or certificate has been suspended or revoked by the commission, and shall forward the same to the commission. Whenever the death of any person results from any such accident, the commission shall suspend forthwith the license of the operator of the automobile or the certificate of registration of the motorcycle involved in said accident, and shall order the said license or certificate to be delivered to it; and the commission shall revoke the same unless, upon investigation or after a hear-

(*Continued on page 753.*)

**States that Revoked Licenses in 1913**

| State | Number Revoked | Number Suspended |
|---|---|---|
| Massachusetts | 146 | 286 |
| Connecticut | .. | 84 |
| Maryland | 12 | .. |
| New York | 10 | .. |
| Rhode Island | 5 | 4 |
| New Hampshire | 4 | .. |
| Vermont | 4 | .. |
| District of Columbia | 2 | .. |
| Maine | 1 | .. |
| Total | 184 | 374 |

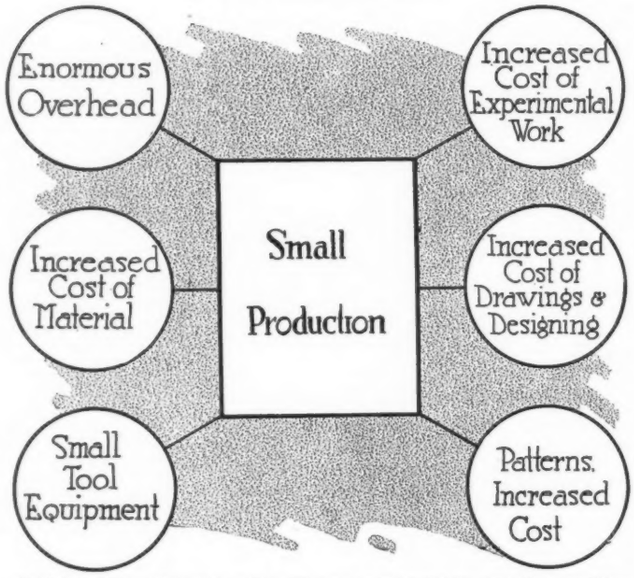
# U. S. and British Production Contrasted

## Quantity Output of the American Plant Compared with Individual Manufacture as Practiced in the British Automobile Factory

By D. McCall White

HAVING been much struck by the really tremendous motor car production in the United States, I determined that as soon as opportunity presented itself I would cross the Atlantic with the purpose of learning how it was accomplished. Through the courtesy of the head officials of various companies, I have been enabled to gauge and make comparisons between British and American production.

To sum the whole matter up in a nutshell, the secret of the American successes are by reason of perfect standardization and the production of one model without variations.




Factors that raise the price of cars produced in small quantities

I am convinced that if the British companies would learn this point from the States and launch forth upon a proper standardized article, they would be able to hold their own with great success.

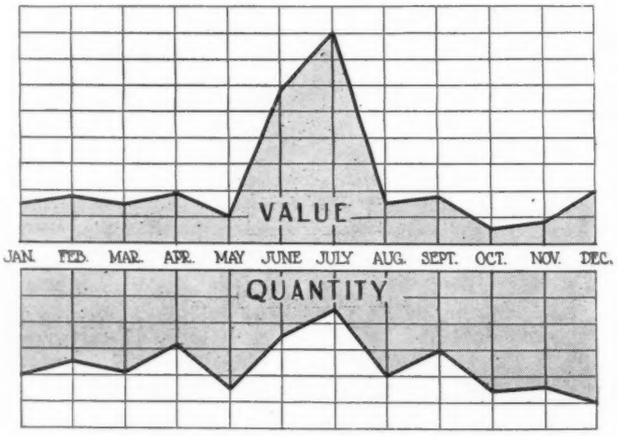
The idea which seems to prevail in Britain at the present moment, among the companies which produce the better class of automobiles, is that if they went in for mass production they would lose their individuality entirely and that the automobile instead of having universal fame as a product which the highest engineering skill could produce would, by very reason of this mass production, become an inferior article. My reply to this is that if an automobile cannot be designed without a tremendous quantity of individual and detailed skilled attention then better far had it not been produced at all, because it must and will, by reason of its delicateness, become a nuisance to its owner and require constant skill and attention to keep it in perfect running order.

### Abhor Shoddy Appearance

One thing that must be borne in mind is that the British engineer abhors any engineering production that appears cheap or shoddy and in many cases this is the British attitude throughout. On the other hand, the Britisher is, like the American, a man who takes a common sense view of things, and my opinion is that the British buyer demands from the British producer an article commensurate with the price he is asked to pay, and if the British producer did not demand such a high figure then he would not be asked for special types and alterations to his standard production. The man in Britain, if he buys a cheap and nasty automobile, knows it is cheap and nasty before he buys it, and makes allowances for its behavior.

In Britain manufacturers have never yet settled down to standard production. They produce in some of the largest factories no fewer than four or five different types of automobiles, and this necessitates switching over continuously, with disastrous results upon production, as well as upon prices.

If one considers the question of one of the largest producers in Britain manufacturing four different types of chassis, instead of producing the whole of one type and then switching over to the other types in sequence, the production manager is hampered by being required to produce fifty of each type, one after the other, and then perhaps he may be allowed to go on for 200 of one type before being again switched over. This is complicated, to say the least.

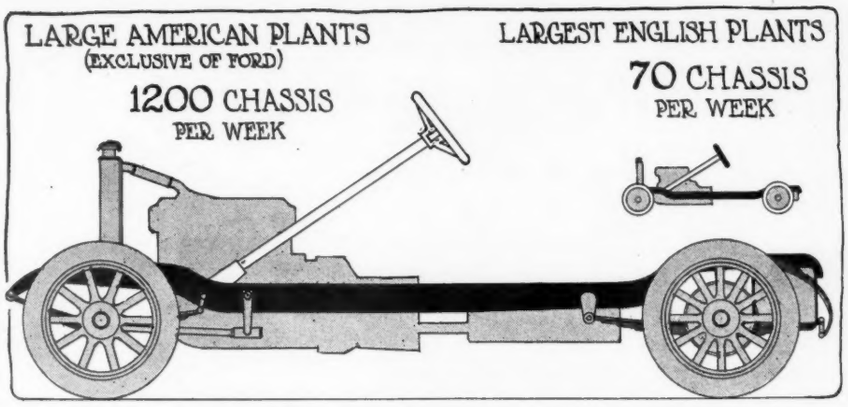



Curves showing relation of value of product to the number of cars produced from month to month, based on an actual year in a British factory. This shows that the theoretical argument that, since it costs more to manufacture one type of chassis than another, the value of product will be constant even though the quantity varies, is false. The value curve shows this

In addition to this, when he is half through with his year's production and has got things into full swing, the sales element will discover that they want more of another type, with the result that the unfortunate production manager must again switch over with an entire disorganization of the whole factory. Such cases as these repeat themselves right through, from department to department, and are never really got rid of.

Again, the replacement factor is aggravated because he must await until his next batch of the same material comes through before the first batch is completed, because of the scrap which must and will occur.

These points, then, upset the whole factory production and are some of the evils which the British manufacturer is up against in addition to the smallness of his output and the numerous alterations which are called for by the sales department and which seem to be specially confined to European car purchasers. These alterations consist of different gear ratios in the back axles, different steering rakes, different positions of change speed and brake hand levers, different kind of finish, etc.




The largest British factories do not turn out over seventy chassis a week, while several of the American factories, exclusive of Ford, make 1,200 chassis a week. Ford produces nearly that many a day.

### Produce Seventy a Week

The largest plants in England turn out not more than seventy chassis per week. In one or two of the best known factories the methods employed in production compare very favorably with the best production practice in the States, as the use of the multiple tools is coming very much to the fore and has been considerably studied within the last 4 or 5 years. As yet no stamping or drop forging plant has been laid down in the automobile factories, the parts always being purchased outside, nor do I think that these plants will ever be established by the automobile producers themselves, because the production in every case is very much too small.

Some of the chief engineers in the larger factories of Europe are also responsible for the production end, as, of course, this can be done with satisfactory results where the output is comparatively small compared to what is being done by manufacturers on this side. This again has its advantages, because it forces the engineer to design his production so that it can be produced at the cheapest possible cost, and operations are carefully studied and the parts are designed to suit the plant in addition to being carefully studied before they are permitted to be sent into the factory. Many special machines are designed by the jig and tool departments under the direction of the works manager who, in many cases, is also responsible for the designs of the automobile itself. Great difficulty is experienced in Britain because of the disinclination of the workmen to operate more than one machine, and this prevents to a great extent the use of automatic plants.

I have rigged up machines using multiple tools for the automatic production of pistons, steering swivels and articles of this class, and after much persuasion on the part of the superintendent we have been enabled to put batteries of such machines into operation. In some factories, however, the same success has not been met with, and strikes have been caused by endeavoring to get the men to work on this principle. The use of the multiple drilling machines and multiple drilling heads is not very universal, as the production is not sufficiently great to permit of many of such machines or tools being purchased.

Another point which prevents the outlay of large sums of money upon jigs and such labor saving methods, is that designs are often altered, and in view of the small production the outlay would be prohibitive.

Some few years back all the limits and tolerances were left to the judgment of the men in the factory, but lately I have always enforced the specifying of limits on all the drawings, a move which caused much trouble and inconvenience to commence with, as the average draughtsman knows less about limits than limits know about him. The only way of getting out of the difficulty was to appoint a special man for this and this purpose alone. Instead of putting the actual limits or tolerances on the drawing, we classified these limits under letters, so that all the man had to do was to ask from the tool stores the classification number gauge of a certain size.

In the best factories of Europe a laboratory is in use for the purpose of testing all material which is or likely to be purchased. This laboratory is controlled by the engineering staff and a chemist is employed for analyzing parts of the material as it comes in. A testing machine for tensile tests, compression tests, etc., as well as a Brinell machine and a fatigue testing machine is also installed.

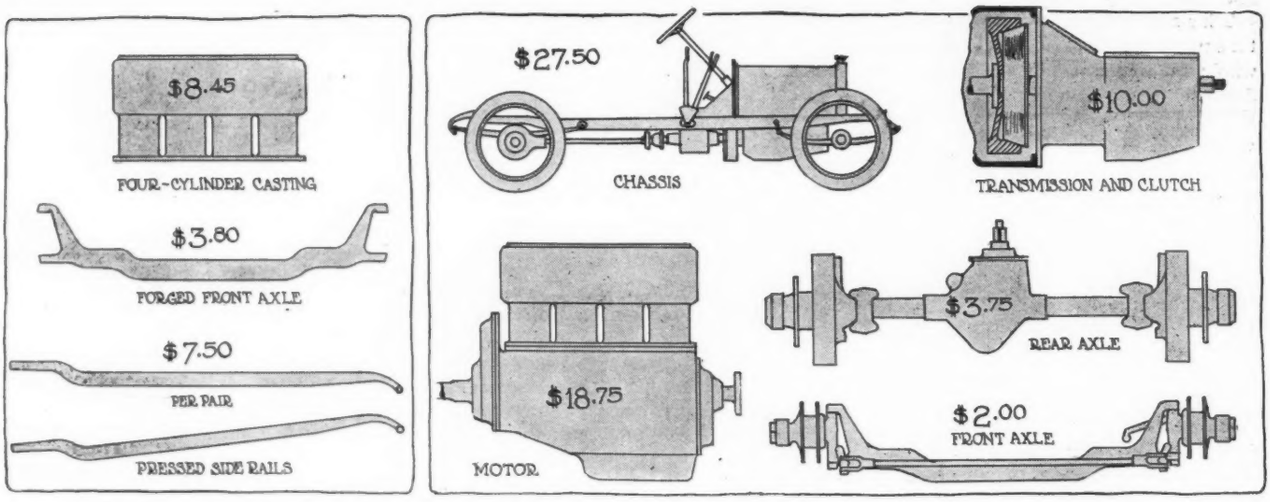
So far there has been little development of the assembly proposition in Britain, and whilst this has much to commend it, I am of opinion that it rather hampers originality of design, although naturally the automobile can be produced cheaper.

### Specialization a Big Factor

I have been much struck by the specialization proposition and the development of same in the States. This is a point which I have always endeavored to obtain, although many difficulties present themselves, the British workingman objecting to the specialization principle as he states, and very truly, too, that he will later on be able to tackle only one job and one job alone, and while he might be able to do that job splendidly, there is not sufficient field for him in the British Isles to obtain many such positions, so that his opportunities of obtaining a fresh start would be very meagre should he have the misfortune to lose his position. There are not anything like the same quantity of factories in Britain that there are in America.

America gains because of the great size of her automobile industry, because of the enormous number of large factories compared with Britain, because of the organiza-


The average machinist in Great Britain gets about $12.50 a week. Wages are low. The American earns at least double this




Some assembly labor costs determined in a British factory producing 500 cars, fifty at a time

tion of same and the specialization of one type, as well as the specialization of parts on that particular type.

The large factories of America keep men producing the same article year in, year out, while even if Britain wanted to do this sort of thing she would be unable, by reason that the majority of machines must be used for producing more than one article and also one man must be used in the same capacity.

The working man in America is in many cases much better cared for than in England, so far as factory conditions are concerned. The American companies keep their factories better, they provide better accommodation for meals, water for cleansing purposes and proper accommodation for drinking without the use of drinking cups, and in fact hygienics are studied better so far as many factories are concerned than they are in Britain.

If therefore, the factories in Britain could lay out a sufficiently large program of one standard type on the lines of multiple tool production and specialization, she would be able to hold her own handsomely as regards price against the American productions, because undoubtedly to-day she is producing automobiles which are of the highest class and engines which in many cases are developing certainly twice the horsepower of the engines produced on this side, capacity for capacity.

Undoubtedly Great Britain realizes to-day more than ever how far behind she has been as regards the production side of the business, and that were America to produce automobiles which had the power and general refinement of the British automobiles, at about one-third less the price of the British automobile, she would go out of the business of automobile manufacturer altogether.

### Price Sells the Cars

One may discuss the question of patriotism, but in every country there is mighty little of that when it affects a man's pocket. Undoubtedly money talks all the world over, and it talks just as loud in Britain as it does in the States, and the man in the street is out for all he can get for his money, whether he be British or American. If America, therefore, can produce an automobile with the body carrying capacity, the power, economy, and general refinements of the British chassis, at a much cheaper figure, then she will be able to hold the European market. On the other hand, it must be borne in mind that if Britain produced her automobiles on American production lines, with her cheaper labor she would undoubtedly more than hold her own. This, then, is what Great Britain is now realizing and is at present developing with the utmost possible speed.

Taking the highest class of British automobile, 15-horsepower type, in batches of about 500, going through the machine shop in lots of 50, the net labor approximates $90, so far as the machine shop is concerned, while the net labor on assembly approximates $60, prices which, of course, could be vastly improved upon if quantity production, with proper jig and tool equipment, were introduced. These figures were obtained, using multiple tools and modern production methods upon many of the parts, as well as automatic machinery and a fairly decent equipment of jigs, although much less than would be used in an American factory.

Regarding the cyclecar, or small car proposition, the only solution to this in my opinion is the assembly proposition in Great Britain, because once America starts into this line of business seriously, it will be possible to flood the markets of Europe with automobiles at prices beyond their comprehension. All these points, however, must be carefully considered in conjunction with the fact that to obtain the majority of the sales the goods must be of equal quality to those produced in Europe. Great Britain at the present moment is not developing so much the cyclecar as the small car, and this particular type of car is a very high-class proposition.

In addition to having advantages over Europe on the method of production, America has resources for obtaining material which, by reason of the enormous production, can be purchased at a very low figure indeed.

### Unit Tool Cost Affected

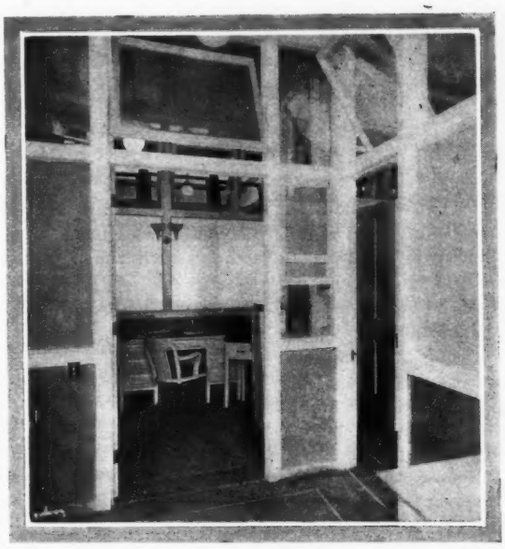
I am well aware just exactly what economy can be practised. If the principal of a firm in Great Britain decides to allow one thousand automobiles of one type to go through the factory instead of five hundred and thereby effects a great saving, I can strongly appreciate what it means if twenty thousand automobiles of one type are allowed to be produced straight through. The liberty one has in the shape of special tools, even if the sum allowed amounted to $50,000, would come to much less per chassis than if one had the sort of equipment one requires to put up with in Great Britain.

If one considers again the cost of material on the 15-horsepower automobile above mentioned, this approximates about $320 per chassis, so American manufacturers will realize just exactly what this means, and what difficulties the producer has to contend with on the other side. The points which bear most on the subject are the enormous overhead charges due to the smallness of production, the increased cost of material for the same reason, the small equipment of tools, due to the small production, which will not allow of more than

(*Continued on page* 743.)

# Packard Has Six-Room Hospital

RECENTLY the Packard Motor Car Co. set aside six rooms on the first floor of the administration building of its large Detroit plant, remodeled them and now devotes them to a hospital for the emergency care of all employees injured in the factory and for the examination of every applicant for work.



Corner of the Packard hospital, showing the office

**Modern Equipment**

This hospital includes in its equipment everything needed for the most modern and efficient care of the injured. Cleanliness is the watchword, and the white enamelled walls, white furniture and nickel fixtures "make life a constant burden to bacteria," to quote one Packard man.

The lighting is of the semi-indirect type, which, though free from shadows, is powerful enough to meet the most exacting demands of present-day surgery.

Two separate halls containing six small booths are used for the physical examinations of all applicants for work in the Packard shops. Every employee must take this examination, which investigates the man's eyesight, his weight, and so on.

On one side of the office is a comfortable rest room and on the other are the operating and dressing rooms. Instantaneous steam sterilizers for bandages and instruments, water sterilizer, marble operating tables and a complete modern surgical outfit are boasted of by this new hospital. The establishment also includes a dark room in which there is a powerful magnet used for removing particles of metal from injured eyes, a small ward for emergency cases and a waiting room.

This hospital department comes in contact with about 100 men each working day. These are not all injury cases, by any means, for the greater proportion are simply there for physical examination. Two doctors are employed regularly, one a surgeon and the other assisting him.

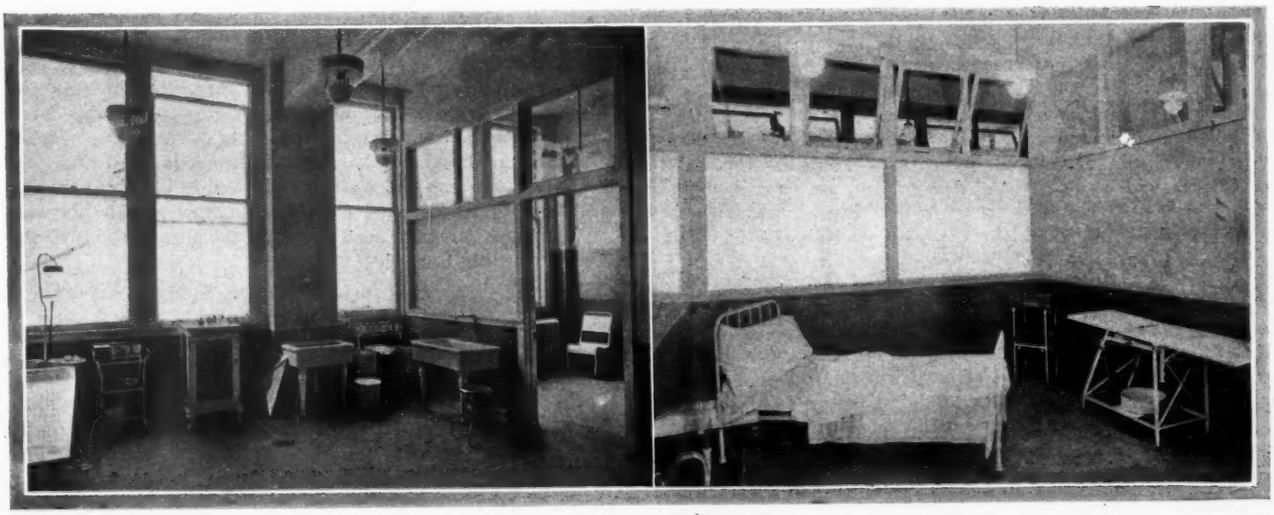
**Ambulance Provided**

Employees who are hurt while at work are given the best of medical attention from the moment of injury until they completely recover. To hasten the transfer of an injured man to the hospital, the company keeps an ambulance car constantly in readiness. The plant extends about 3-4 mile along the railroad, and hence such an ambulance is needed should anything happen at some one of the buildings or departments remote from the administration building.

However, there are very few injuries in the factory, it is said. A Bureau of Safety is an important part of the factory organization. This department is constantly at work endeavoring to minimize risk throughout the shops. Protective devices have been installed under its direction, guards placed where there is the remotest chance of injury, and rules for the employees made which help to reduce chances of accident. In the 2 years during which the Bureau of Safety has been operative, the number of accidents has been decreased 60 per cent. according to the factory statistics.

And while all factory appliances have been made as nearly fool-proof as possible, nevertheless, accidents are not impossible, hence the hospital plays its part.

It has always been a belief of the Packard company as well as many others of the big businesses that the welfare of the employees is the first essential to the welfare of the company, and the new hospital is but evidence of this conviction.



At the left is the operating room of the hospital, finished in white enamel with nickel trimmings. At the right is a small ward specially devoted to emergency cases

# The Automobile Engineers' Forum

## Inventor of the Pneumatic Tire Gives History of Rubber Vulcanization—Process Discovered by Goodyear, in America, in 1839 and Hancock, in England, in 1843

By J. B. Dunlop

DUBLIN, IRELAND—Editor THE AUTOMOBILE:—The history of the invention, or discovery, of the vulcanization of rubber may be of some interest to your readers, for unless vulcanization had been discovered we never could have had a practical solid tire, and such a thing as a pneumatic tire would have been an impossibility.

It would appear that the invention of vulcanization was partly the result of an accident. The process was practically discovered in America and in England, independently, about the same time.

**Sulphur to Prevent Stickiness**

In 1832 Hayward used sulphur to prevent stickiness. No doubt before that date many things had been tried to prevent the surfaces of rubber from adhering to each other, or from adhering to the surfaces of other articles. At present solution of soap is largely used for that purpose, and French chalk is used for the like purpose when lubrication is required.

In 1836, Hancock, England, invented mastication of rubber and the mixing of dry powders.

In 1839, Goodyear, America, discovered vulcanization by heating a mixture of rubber and sulphur, but did not patent it.

In 1843, Hancock took out a patent for vulcanizing rubber by immersing sheets of rubber in melted sulphur. This process would only be applicable to thin sheets of rubber as the melted sulphur would not penetrate far into the interior and the surface of the rubber would be first vulcanized. I presume the temperature would not range much over 266 degrees Fahrenheit in order to vulcanize rather slowly and allow the sulphur time to penetrate as far as possible.

**Goodyear Obtains Patents**

In 1844, Goodyear patented his process of vulcanizing a mixture of rubber and sulphur in England and America, and he also patented his triple compound consisting of rubber, white lead and sulphur.

In 1846 Hancock patented a method for vulcanizing in moulds by heat.

It is rather curious to note that Hancock, though he was the inventor of mastication and the mixing of dry powders with rubber, did not, in his process of vulcanization, mix the (dry powder) sulphur with the rubber, but immersed the rubber in melted sulphur. The former process—the Goodyear method—is obviously the superior one and the one now in common use.

**Cold Vulcanization Invented**

In 1847 Parkes patented the cold process of vulcanization for textiles. He invented his process in 1846, and the ingredients employed consisted of carbon bisulphide 100 parts, and sulphur chloride 2½ parts. A similar process is in use in this country for repairing cuts in motor tire covers and also for patching air tubes.

When carefully done under pressure the repair is very lasting, and it has the advantage of not overvulcanizing adjoining rubber. The raw rubber used for filling up the cuts is in the form of threads.

When cuts are accidentally caused in the tread of the tire cover it is rather surprising to see how they gape. This shows that the manufacture of tires is far from being perfect.

**Rubber Tread Under Compression**

When the first pneumatic tires were made in Belfast in 1888 and early in 1889, the rubber on the tread was always under compression. The rubber cover was supplied in straight lengths, the ends were cut with a slope and joined with solution. Had the rubber cover not been in compression the joining would soon have given way. The application of the brake to the tread of cover did not seem to affect the joining.

In 1848 Goodyear patented in America for vulcanization in moulds by heat.

In 1850 Reithoffer in Vienna patented vulcanizing rubber and he enameled by means of hypochlorous acid, hypochloride of soda or hypochloride of lime.

**Hard Rubber Discovered**

In 1851 Goodyear discovered hard rubber, without which we could not have the beaded edge tire cover now used exclusively, in England, France and other European countries, for motor cars.

Tradition says that vulcanization of rubber was discovered accidentally some time before the process was patented or brought into practical or commercial use.

It would appear that rubber was being melted or softened in a vessel or mould placed on the hob of the kitchen fire. Sulphur was used to prevent the rubber adhering to the inside of the mould. When the rubber was removed from the mould it was found to be much more elastic and comparatively unaffected by heat or cold.

In England 150 years ago the iron hoops which were heated and shrunk on wheels for binding the parts together were called tiers, and they were so called because they tied the several parts, the felloes, spokes and hub, of the wheel together. So it would appear that the English tyre or American tire is a corruption of the original word and does not convey its true and original meaning. There are people in Yorkshire whose family name is spelled Tyer and no doubt this is the way the word was spelled in old English.

On some other occasion I may write a very concise history of solid rubber tires. The history of the pneumatic tire is rather interesting and most amusing.

J. B. DUNLOP.

## Designing Worm Gears for the Modern Motor Truck

PHILADELPHIA, PA., Editor THE AUTOMOBILE:—The worm gear axle has many points that recommend it for use in the modern truck. These are simplicity of construction, elimination of parts used in the present method of driving, decrease in the cost of maintenance and efficiency of the worm gear itself. In a worn gear system there are only two gears to be taken into con-

sideration, whereas in a chain drive there are one pair of bevels, four sprockets and two chains. This is two moving parts of the worm gear to eight of the bevel gears.

This is a scientific advantage rather than an engineering one, but its effects are practical as well as theoretical. Again, in the bevel drive the power in the motor and transmission is diverted at right angles from its original direction and then rediverted to the rear wheels. This loss in economy is a scientific deduction and not an engineering one, although making itself felt just the same.

**Worm Drive Easier on Tires**

As one of the engineering problems involved, it has been proven beyond a doubt by those in a position to know, that a worm gear drive has less destructive action on the rubber tires than a chain-driven truck. This is due to the fact that in trucks using the worm drive the wheels are subject to true differentiation only for the reason that the driving shaft engages with the large bevel gear of the differential pinions which itself is free to either float forward or backward on the differential. This freedom to float in either direction without loss of time in response to varying road conditions is inherent in the worm drive only, whereas the varying road conditions on the chain-driven truck first effect the slack in the chain, which slack is necessary in all chain drives, and then produce a second adverse effect on the differential in the jackshaft. The element of time entering into both of these adverse actions is sufficient to produce a skidding or sliding effect on either or both the rear tires. With the heavy loads that the trucks of today carry this is necessarily destructive of the tires. This is a practical engineering feature not deductible from scientific considerations.

**Gears Must be Right Size**

In designing the worm gear axle after having determined the scientific value of the metal to be used in the worm gears, the first step in the engineering line consists mainly in making the worm gear of such proportions that it will be in harmony with the balance of the truck. To have the gears too large means unnecessary expense and the gears inefficient. If the gears are too small they will give no end of trouble.

It is first necessary to take into consideration the motive power required. Second the gearset, which is the means of carrying the revolutions of the motor shaft to the gears must be decided on. Careful consideration must be given to the amount of horsepower that will be applied to the propeller shaft after it leaves the transmission. The diameter of the gear and pitch of the teeth can only be determined after the engineer has worked up for himself a scientific knowledge of the speed and torque of the propeller shaft, at the same time acquainting himself with the pressure per square inch that the metal he will use in his worm wheel will carry at safety, at the various speeds of the propeller shaft.

After the sizes of the worm gears have been decided on it is equally important that they should be mounted in a casing with such factors of safety in the bearings and mountings that the engineer will know that the gears will stay in exact alignment. Many failures in the use of worm gears have resulted from this cause alone. This is the keynote of a successful worm gear axle for a modern motor truck. There is allowable in the remaining parts of the axle a variation of design and material that may be in harmony with the balance of the truck. There is no question, however, that the full floating type has a majority of points in its favor although it is more expensive in construction.

**Care Necessary in Changing**

We have now arrived at the business considerations involved in changing from chain drives to worm gears. The adoption of the worm gear drive by any truck manufacturer is not to be done hastily but should be done with care.

First should the manufacturer take into full consultation his engineering department with a view of using everything that has been found good in their particular type of truck. Only such changes and corrections should be made as would be found advisable by their years of experience. The adoption should be timed and planned to change construction with the least possible expense in the routine of manufacture and with the least possible delay to the truck owner in the handling of his traffic.

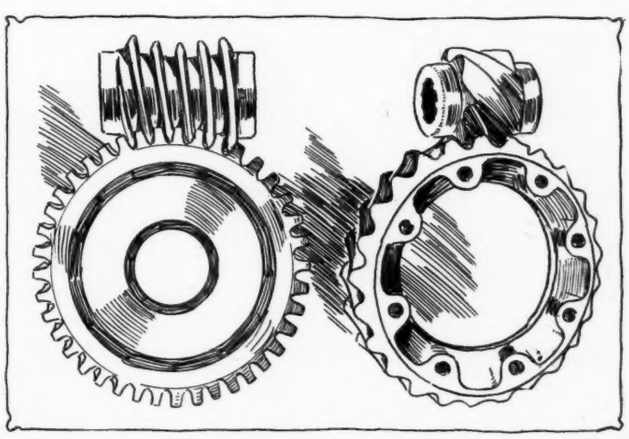
**Replacing Horses with Worm-Drive Truck**

One of the old manufacturing companies of Philadelphia placed an order recently for a motor truck of the worm gear type, and was only convinced of its efficiency and reliability by the most careful demonstration that the writer has ever known. The company previously employed four double teams. Its entire work is now done by one motor truck, the economy of which is too startling in cold figures.

A competent truck engineer was sent to the company's works and personally took charge of its shipping department, and a careful record was made of each trip, the loss of time in loading and unloading, the duration of each trip, and the tonnage.

This was done for two weeks. The teams were then put out of commission and a truck was put in service, and the same careful record kept of the service. The truck was then put out of service and the teams put in service for 30 days, and the results of this experiment were so convincing that the horses have been disposed of permanently. Thus was solved a business problem in the transportation of freight, that apparently had little to do with the science and engineering applied in building motor trucks, but nevertheless was the result of scientific engineering.

There are not sufficient worm gear trucks in service to make a general comparison from an economical standpoint of the consumption of gasoline and oil, but in two comparative tests recently made between a worm gear-driven truck and a chain-driven truck, between Philadelphia and New York a complete round trip being made in each instance, fully loaded, the trucks in question having the same carrying capacity, it was shown the chain-driven truck used over twice as much gasoline, and over three times as much cylinder oil. The worm gear truck referred to was made by the Hurlbut Motor Truck Co. of New York.—MINOR HARVEY, chief engineer, Keystone-Hindley Gear Co.



Two types of Hindley worm drive. At the left, single-thread of 5.75 inches pitch diameter and .375 inch pitch, having six teeth in contact with the worm. The pressure angle is 12 degrees and included angle is 24 degrees. At the right, worm gear and conical spiral worm with a speed reduction of 3.57 to 1, 25 by 7 teeth, .875-inch pitch. This drive is designed for a 40-horsepower gasoline touring car

# Conditioning the Car for Service

## Many Automobiles Are Painted and Varnished to Excess—Often a Skillful Touching Up Will Be Less Expensive and More Satisfactory

By M. C. Hillick

THE season is already here when the car owner must give his attention to necessary repainting and revarnishing repairs. Practically every car exposed to a season of road-service will need some attention, either at the hands of the professional painter, or by the car owner who may elect to apply the repainting or revarnishing repairs himself.

The first essential in connection with the painting and varnishing of the car consists of a thorough examination of all surface conditions, in order to eliminate unnecessary repairs.

It is safe enough to say that not a few cars are being repainted and revarnished to excess. Strange as it may possibly seem, it is a comparatively easy matter to apply too much paint or varnish to the car. The car surface, as experts the world over will tell you, does not thrive by mere depth of paint or varnish film. On the contrary, every surface that has originally been made a thing of beauty by the painter lives on and yields the car owner a good rate of value for his money invested, in being seasonably given the necessary repainting and revarnishing, or simply revarnishing, repairs.

In other words, a close examination of surface conditions from time to time, either by the painter or the car owner, or both, will reveal the surface conditions which really require renewal.

The least paint, color or varnish applied to the car after it is received from the manufacturer the better.

The main thing in all these painting and varnishing matters is to maintain, at a minimum depth of material, a good color and luster.

The owner by cultivating the habit of directing close observation to the surface condition of his car, even though he be not versed in the technical features of the painting craft, very soon becomes an expert in the economical and proper upkeep of the surface.

### Cleaning and Revarnishing Sometimes Sufficient

The car with its color showing original purity of tone, unfaded and unbleached, with no cracks or fissures extending into its film, with its striping or decorative effects intact and showing, as many surfaces do, only a warm, and possibly slightly fractured varnish surface will require, as a rule, merely rubbing down with water and pulverized pumice, thorough washing, abrasions of the surface touched with a bit of the original body color, and then given a heavy coat of some reliable body finishing varnish. Such a treatment will suffice to carry the car over the summer in fine condition, and in contrast to the hit or miss practice prevalent in many parts of the country of coating the car up with color and putting on a couple of coats of varnish may be considered not only economical but ultimately a real advantage in several ways.

Of course, if the varnish is afflicted with checks and fractures running well into its depth it will be necessary to rub the surface with water and pulverized pumice and then to apply one coat of clear rubbing varnish, this to be reduced in due season by rubbing with the aforesaid water and pulverized pumice stone and then finished.

It often happens that the car doors and certain parts of the car body exposed to particularly violent straining and oscillation show what are correctly termed "force checks"—that is to say, checks in the surface, in the case of the doors, due to hard slamming in closing, and in other parts of the body to the sudden and violent wrenching imposed. "Force checks" may be distinguished by the following characteristics: long, circular fractures, interspersed with short fractures, practically all of which run in one general direction and center usually at the point of greatest surface strain. Ordinary surface checks extending into the paint structure may be detected by the fact that they are chopped into little squares, more or less regular, and at all times plainly unrelated in their appearance to the "force checks."

When either or both of these two sets of conditions exist it will be necessary to apply extra processes to eliminate them, even temporarily. When these surface fractures are of recent origin an extra coat or two of varnish will not infrequently suffice to obliterate them effectually. When of long standing, however, more exhaustive processes are necessary.

### Cracked Finish Must Be Sandpapered

First, the surface may be sandpapered very thoroughly with No. 1 sandpaper and then faced up with hard drying putty. This is done by using the putty in the form of a glaze and working it over the fractured parts from the point of a broad, half-elastic scraping knife. This putty when dry is rubbed down with blocks of artificial pumice dipped in equal parts of raw linseed oil and turpentine.

In the event of a specially aggravated case of surface fracturing it will be necessary to either remove the old paint and varnish entirely from the surface and repaint and refinish or to face up with putty, as above advised, and then apply two or three coats of rough stuff and then rub down with the artificial pumice blocks dipped in the mixture of raw linseed oil and turpentine. Coloring and varnishing follow over this surface in the usual manner.

In all cases where surface fractures appear in advanced stages of development it will be necessary to at least sandpaper the body surface down very thoroughly, apply one coat of color, one coat of varnish-color, one coat clear rubbing varnish and one coat finishing varnish. This is essentially the minimum treatment.

In the case of a more advanced state of surface fracturing it will be found necessary where removal of the entire paint foundation is not assented to, to follow the sandpapering of the surface with a thin mixture of some good pigment containing sufficient raw linseed oil to endow it with ample elasticity, over which in regular order should be applied at least three solid coats of rough stuff, these in due season to be rubbed down with blocks of artificial pumice dipped in equal parts of raw linseed oil and turpentine, the surface then to be painted and finished as new. A year or two, and often more, of service may thus be obtained from the old paint surface.

### Some Parts Need Special Attention

Guards, fenders and hoods are parts of the car which usually, irrespective of the processes applied to other parts of the vehicle, will require some extra refinement. Naturally the hood should carry the minimum depth of painting material, but that thin structure of finishing material should be of the best possible quality, otherwise the heat to which the hood is subjected will play havoc with the finish. Fenders, mud-guards, etc., should as a rule get a fresh coat of color and enough varnish-color and varnish to make them compare favorably in point of finish with all other parts of the car.

In this painting and renovating of the car the chassis should get a fair share of attention. The appearance of these parts determines in very large part the general appearance of the car, which fact is all too often overlooked. Refinement of details is the last word in the well-balanced finish of the automobile. To this end the finish on the chassis should be in strict harmony with that on the car body.

Very often it occurs that the chassis, by reason of the hard road conditions to which the car is exposed, require a coat of color, one of varnish-color and a coat of good finishing varnish, whereas the body of the car may be in need only of a coat of varnish. Not only as a consideration of economy, but in view of the requirements of the general appearance of the car, the chassis should always be given a process of treatment proportioned precisely in its relation to the car body.

### Top Must Be Carefully Sponged Off

In conditioning the car for its season's work the top should have its fair share of attention. Hand-buffed leather tops very often need nothing more than a careful sponging off with tepid water and castile soap, the leather to be dried off with a chamois skin. Machine-buffed leather tops with the enamel fractured or worn thin will doubtless require, in addition to sponging off with the solution of water and castile soap, renovating with a thin application of some reliable leather dressing. This may be obtained in the market, or it may be prepared by the painter or the car owner.

If so prepared, add to one part of liquid asphaltum three parts of castor oil, to which further add a little ivory black to give the proper intensity of color. Apply this material sparingly to the leather. This same dressing may also be used to advantage upon rubber tops.

### A Formula for a Leather Renovator

Another formula for preparing a leather renovating mixture consists of darkening neatsfoot oil with ivory black, applying this mixture to the leather with a soft cloth and then polishing dry. This serves to preserve the top and to give pliability to the leather. In respect to genuine mohair tops with a rubber interlining, which all double texture mohair fabrics have, the safe and sure treatment consists of a brisk brushing with a stiff broom, or a careful cleaning with castile soap and soft water, the condition of the top suggesting which of the two treatments is most desirable for the case in hand.

In any event, the application of kerosene, gasoline or any petroleum by-product, or any oil of a similar nature, may be considered very detrimental to the mohair top and especially destructive to the rubber interlining.

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## Concrete a Possible Solution to Road Constructors' Problems

RECENT experiments in the Adirondack section of New York state with concrete roads have brought this method of construction to the attention of constructors. The low maintenance cost has been advanced as the prime reason for the laying of concrete roads, although it has also been claimed that they are free from dust and are not affected to a large extent by water.

### Cement Incorrectly Applied

In the Adirondack roads it was noted that cracks developed shortly after they were laid, but this was stated to be due to the incorrect application of the cement. In this connection it is interesting to note the views of one of the leading concrete companies which, of course, favors this type of construction.

This concern states that the economy of upkeep of concrete road offers one solution to the question of taxing the motorist for road maintenance. In five important Eastern states the average maintenance cost on macadam roads was over $800 a mile in 1912, while on concrete roads the average cost of maintenance has been less than $25 per year. With this as a basis a tax of $2.50 per car per year on 500 cars would keep 50 miles of road in perfect order.

### Macadam Expensive

With macadam, taking New York's figures, in which it is stated that the maintenance on macadam roads in 1912 was $1,009, it would take 20,000 cars to keep 50 miles of macadam road in repair. This, the concern goes on to state, would be accompanied by frequent interruptions of traffic during repairs. Further claims made by this concern on concrete roads are as follows:

"Aside from the economic advantages, it is a great satisfaction to have concrete roads, owing to their freedom from mud and dust. While we maintain our present macadam roads to the best of our ability, which means at tremendous cost, we constantly encounter barred highways bearing the sign: 'Closed for Repairs.' This situation prevails at all seasons of the year, and even where our macadam roads are in what may be termed perfect condition we have the additional expense of oiling them, which, in connection with their high crown, makes them extremely slippery and dangerous for both horse-drawn and motor-driven traffic.

### A Concrete Illustration

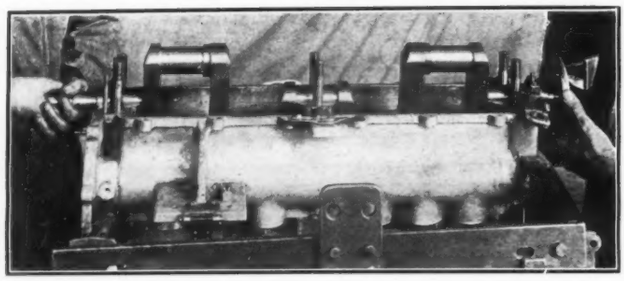
"The accompanying illustration of a concrete road recently constructed between Bethayres and Somerton, Pa., along the Bound Brook Division of the Philadelphia & Reading Railroad, clearly illustrates the advantages.

"The road shown runs through a beautiful rolling country and supplants a common dirt road traversing low, flat land, a highway that was impassable at certain seasons of the year, owing to bad drainage and its saturated condition. There was put down over this ordinary dirt road the continuous and indestructible slab of concrete shown in the picture. It has resulted in a highway always free from mud and dust and one that is as convenient for pedestrians as for owners of automobiles and horses.

View of the Bethayres-Somerton concrete road. This is the type of indestructible road that has cost less than $25 per mile per year for maintenance. It is always free from mud and dust and passable throughout the year. It replaces a common dirt road traversing low, flat land that was impassable at certain seasons

### Substantial Work

"The thoroughly permanent character of the work throughout is shown in the substantial culvert in the foreground of the picture. After the roadbed was prepared and side forms erected, there was placed upon this base a wet and mushy mass of Portland cement, sand and stone, which hardened into rock."



# The Rostrum

## Suggests Carbureter Test To Show Proportions of Gasoline and Air

*EDITOR* THE AUTOMOBILE:—*The test of the Longuemare carbureter, reported in the March* 12 *issue of* THE AUTOMOBILE, *brings up a very important and interesting point as regards carbureter testing; one I have never seen mentioned, namely, the correctness with which a carbureter proportions the air and gasoline over all variations of speed and load.*

*A carbureter is designed to perform two functions: to vaporize the fuel and to correctly proportion the air and fuel under all conditions of operation, and yet I have never heard of a carbureter being tested to determine just how well it does the latter.*

*The Longuemare test is interesting in that it shows that this carbureter when fitted to a White engine is economical, and it shows further that greatest economy was obtained at* 1,200 *revolutions per minute, at which speed a horsepower hour was developed on* .61 *pounds of gasoline, but it does not show whether the proportions of mixture were correctly maintained throughout the range of speed, although this may have been the case.*

*Every carbureter maker claims that his device gives a perfect mixture under all conditions of service, or to put it another way, no matter what the pressure drop across the carbureter is the mixture proportions will be maintained. Since the laws governing the flow of air and gasoline are not the same for various differences in pressure across the carbureter some special mechanism is required in order to give fairly constant mixture under different pressure. This is done by means of auxiliary air valves, extra jets, balls and various other means.*

*Some of the carbureter designs using these features undoubtedly approach perfection and on the other hand there are some that do the reverse. Therefore I think it would be interesting to have tests made to determine how well the different carbureters live up to the claims, made by the manufacturers, for their devices.*

*An apparatus for this purpose would not cost very much as all that would be needed are instruments for measuring the gasoline and air, and a brake or dynamometer for measuring the engine power at various speeds and loads.*

*A series of such tests including all the prominent makes of carbureters would show beyond a doubt what carbureter is the best. It would show whether the auxiliary air valve, the deep well principle, the multiple jet or combinations of these is the best. It would show the owner what carbureter to buy.*

*We have had non-stop engine tests by makers of motors that were not afraid to let the public know all the facts concerning their products, by makers who were confident in the merit of their motors. Why not a carbureter test along similar lines? There is some carbureter that is better than all the others and the maker of this carbureter is probably aware of this fact. Let him have his carbureter tested by competent engineers in the manner I have outlined. Let him set a high standard in carbureter design similar to that set in engine design recently by a non-stop test.*

*Detroit, Mich.* *S. V. P.*

### Motor Misses When Accelerated

Editor THE AUTOMOBILE:—I have a car with a 40 horsepower T-head motor, 4.5 bore by 4.75 stroke. The motor will not operate right when you give it the gas quickly, but will go along on a hop, skip and a jump for some distance before it will pick up and fire on all four cylinders, and when the motor stops the gasoline will run back out of the manifold as though it were full of gasoline. It will go along nicely on the level at slow speed and all right on high speed after it picks up, but it will fuss around a good deal before it does. I have cut down the supply of gasoline until it would backfire in the carbureter for the want of gas. I have tried 1.25 and 1.5-inch sizes of different makes of carbureters with no success, so it looks as though the trouble must be somewhere else.

It has a Splitdorf dual ignition system, and it seems to give a good spark. It will jump from .25 to .375 of an inch. The timing of the magneto and also the valves is right. It has a 1.5-inch cast aluminum intake manifold. Is it possible that this is too large and permits the motor to pull too

freely on the carbureter? It is not this car alone that acts like this, but other cars of this make are doing the same thing. The owners of these cars have tried various carbureters, also, without success, so there must be something radically wrong in the construction somewhere.

Pittsburgh, Pa. JOS. R. GALLBARTH.

—The fact that other owners of this make of car have had the same trouble that you have had would seem to indicate that there was something wrong with the design of this machine, and because the gasoline runs out of the manifold when the motor is stopped the difficulty seems to be right in the manifold. The diameter is all right, as a 1.5-inch manifold is the correct diameter for a motor of this size, but it may be that the manifold is improperly shaped. The most important consideration in designing a manifold, next to selecting the right diameter, is to so design the passageways that the same resistance will be encountered, in all of them, by the charge in passing from the carbureter to the different cylinders. In other words, the frictional losses to cylinder No. 1 should be the same as to cylinders 2, 3 and 4. This is necessary in order that all four cylinders will receive the same quantities of mixture. Therefore the manifold should be designed so that the number and size of the bends are the same to all four cylinders. This will insure not only an equal distribution of gas, but will also minimize trouble due to poor vaporization. For instance, if the charge, as it leaves the carbureter should contain small globules of gasoline, the distribution of these globules in the mixture to the different cylinders would be the same, providing the number and size of the bends are the same, but if the passage to one cylinder were comparatively straight and to another cylinder more or less crooked, then, in the former case, the liquid particles of gasoline would be carried along by the air, but in the latter case these particles would be thrown out at the sharp corners and would run back into the carbureter. It hardly seems possible that the designer of an automobile would overlook these points in manifold construction, but as your trouble is a perplexing one it seems advisable to show you that this may be the cause of the poor performance of your motor.

It may be that your difficulty is caused by dirt under the float valve. This would prevent the float valve from seating, and thus cause gasoline to run out of the carbureter. The same trouble may be caused by a bent float arm or by the float being soaked with gasoline.

Another possibility is that the charge requires heating, and if this is the case, by attaching a hot-air intake to the carbureter the missing will cease.

## When and Where to Lubricate

Editor THE AUTOMOBILE:—It has always seemed strange to me that the manufacturers have not given more space to the subject of lubrication in their instruction books. The book I have gives some attention to this very important subject but it does not go into sufficient detail. It mentions that certain parts should be lubricated every day and others less often, but it does not state where these parts are and as I am not an expert in these matters there are many parts mentioned that I do not know the names of, much less their location.

It should be of sufficient interest to the readers of THE AUTOMOBILE, I think, for you to publish a diagram showing in a simple manner the various parts that need oiling, their names and when they should receive attention. I, for one, would certainly appreciate it.

Auburn, N. Y. J. S. K.

—A great many manufacturers give complete oiling instructions with a diagram showing where the parts are situated and a key which tells the names of the parts, but unfortunately there are, also, many makers that neglect to do this.

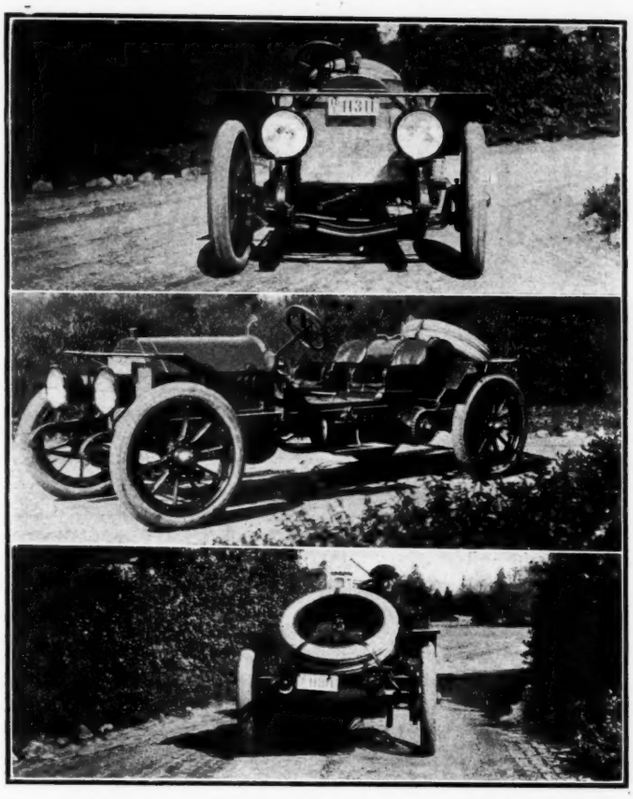


Fig. 1—Three views of Stearns cut down into roadster by a reader

The question of proper lubrication is of great importance, and every owner should have some systematic scheme for car lubrication. However, it is very hard to outline a method that will apply to all cars, because the differences in car construction call for different oiling of the same parts, and then some cars have parts that others do not have.

A diagram that will apply to a great many makes of cars is shown in Fig. 2. Even where this diagram does not apply it will be valuable because it will suggest the parts requiring lubrication. It will be noted that the parts are divided into four groups; those requiring lubrication every day being designated by a circle; those every 300 miles by a solid black circle; those every 500 miles by a hollow square and those every 1,000 miles by a solid square.

Detailed instructions for the lubrication of the parts in all four groups are given below. It must be remembered that all the places that might require lubrication have been included, and that there are very few cars on which all these places will be found.

**Group No. 1—Daily**

The grease cups that supply the following parts should be given two or more turns, depending on the size of the cups and the amount of wear the parts to be lubricated receive: (1) Drive-shaft bearing on rear axle. (2) Pins of internal brake mechanism. (3) Ball and socket joints on reach rod. (4) Clutch thrust bearing, clutch collar, or both. (5) Spring eye bolts. (6) Tie rod and king pins. (7) Commutator spindle bearing. (8) Water pump bearings. (9) Steering-gear housing.

**Group No. 2—Every 300 Miles**

(10) Oil steering column. (11) Put a few drops of light oil in the oil holes of the magneto. Sewing machine oil is excellent for this purpose. (12) Give two turns to grease cups on spring seats on rear axle. (13) Lubricate hand brake shaft. (14) Clean battery commutator and put two or three drops of oil on its surface. (15) Fill grease cups

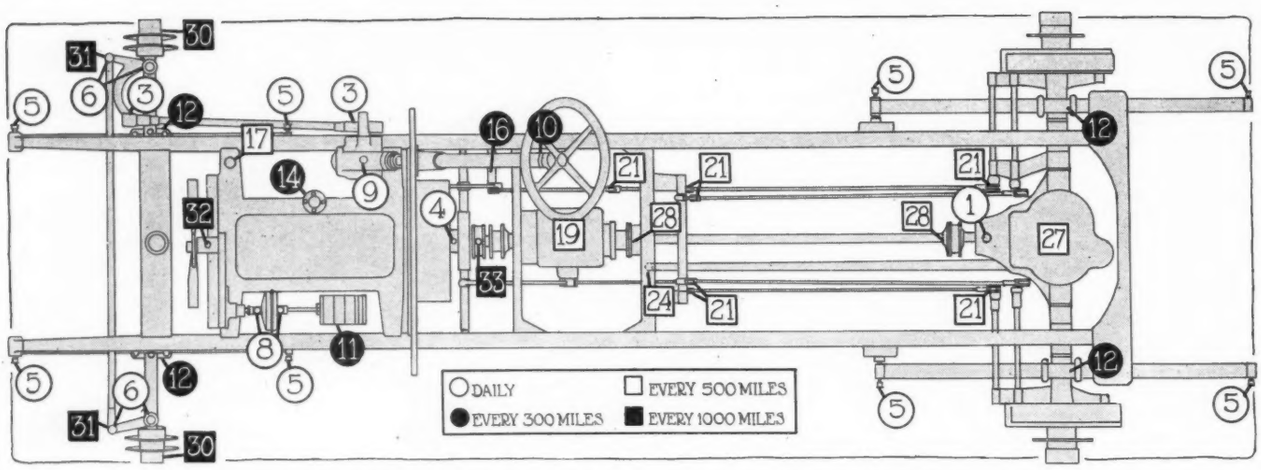



Fig. 2—Diagram showing the places on a car that require lubrication and when they need attention

designated by numbers 1, 3 and 6 and 7. (16) Oil change-gear lever and sleeve.

**Group No. 3—Every 500 Miles**

(17) Drain oil out of crankcase, flush with kerosene and put in fresh oil. (19) Inspect the gearbox and, if required, put in some grease. (20) Put a gun full of grease in the steering gear housing. (21) Oil lever joints below footboard. (22) Oil brake lever and joints on brakes. (24) Oil r grease torsion tube or rod. (26) Fill the grease cups designated by the numbers 4, 8, 9 and 12. (27) Put some grease in differential housing, if required. (28) Charge two rear universals with grease.

**Group No. 4—Every 1,000 Miles**

(30) Fill front wheel hub caps with grease. (31) Fill leather boots over steering rod joints with grease. (32) Oil radiator fan. (33) Oil or grease universal between engine and gearset. (34) Clean strainers in oil tank.

## How to Increase Motor Speed

Editor THE AUTOMOBILE:—I have a 30 horsepower 1912 Overland which I want to gear up and get all the speed possible. I want to know if by changing the position of the camshaft I can increase the speed of the motor. If so, about how many revolutions providing the motor turns 1,800 revolutions per minute?

The diameter of flywheel is 17 inches and the timing is as follows: Inlet valve opens late, 1 3/16 inches; inlet valve closes late, 5 21/32 inches; exhaust valve opens early, 6 27/32 inches; exhaust valve closes late, 2 15/64 inches.

If I can make the motor faster please tell me how?

Panons, Cal. READER.

—You cannot increase the speed of the motor by shifting the position of the camshaft but you might increase the speed by fitting a new camshaft with cams designed to give valve openings suitable for high-speed work. A good timing to use would be the following: Intake opens 15 degrees after top dead center and closes 40 degrees after lower dead center; exhaust opens 65 degrees before bottom center and closes 10 degrees after top center.

In addition, if great speed is desired, the pistons should be drilled and superfluous material moved from the connecting-rods. The pistons should be ground down slightly to provide for the increased expansion that will result from the great heat incident to running a motor at high speed. The clearance at the top of the pistons should be .008, below the first ring .005, and at the lower edge .003 inches.

A hand-operated oil pump for injecting oil directly into the crankcase when driving at speed should be provided.

The magneto timing should be advanced so that with the spark lever retarded the breaker points separate .5-inch before the piston reaches the top of the stroke.

If all these changes are made the speed of the motor should be increased to 2,200 to 2,500 revolutions per minute.

## Another Racy Runabout Design

Editor THE AUTOMOBILE:—There seems to be so much interest in rebuilding touring cars into racy runabouts that I thought you might care to use the photographs of a 30-60 horsepower Stearns, Fig. 1, that I recently cut down.

While this car's appearance has been greatly altered the changes necessary to bring this about were not very difficult. New bucket seats, a round gasoline tank and tire rims in the rear were fitted. The wheels were scraped to bring them back to their natural wood color and the car was painted a dark gray. Leather fenders were substituted in the front and small sheet metal ones in the rear.

The car not only looks well, but holds the road well at high speeds.

Providence, R. I. W. V. ORNDORFF.

## New Felt Washers Needed

Editor THE AUTOMOBILE:—The grease leaks from the inner ends of the hubs of the front wheels on my car. I would like to know whether there is any way of preventing this?

Tampa, Fla. F. B. H.

—As a rule there is a felt washer at the inner side of the wheel spindle to prevent the leakage of grease at this point, as shown in Fig. 3. This washer is probably worn and if you will take the wheel off and replace this washer, you ought to have no more trouble. If this does not remedy the difficulty or if there is no provision for washers, you should use a heavier grease.

## How to Take Up Steering Gear

Editor THE AUTOMOBILE:—1—Will you please tell me how to take up the wear in the Hudson 33 steering gear?

2—What adjustment should the clutch need after 5,000 miles of use?

Santa Cruz, Cal. READER.

—1—Wear in the worm and sector of the Hudson 33 steering gear can be taken up by screwing down on the hexagonal nut at the top of steering-gear housing. But before this is done the cap-screw locking nut adjacent to this nut, and on the front of the housing, should be loosened up.

It is advisable in adjusting the gear, to first jack up the front wheels so that the amount of play can be accurately determined. Then adjust the gear until all the lost motion has disappeared but be careful not to screw down on the nut enough to make the gear bind.

After this is done inspect the ball and socket joints on the reach rod for wear and if there is any, tighten up the socket nuts until it has disappeared.

2—The Hudson clutch should not require adjustment after 5,000 miles. It is so constructed that the tension of the spring never needs to be increased and therefore no adjustment is provided. The only possibility is that the clutch collar and linkage running to the pedal may become worn sufficiently so that the clutch will not release properly. Whenever this occurs, the linkage should be shortened by turning up on the clevis connecting with the pedal.

## Explanation of Cadillac Two-Speed Axle

Editor THE AUTOMOBILE:—I would like to have you explain the construction and operation of the Cadillac two-speed axle. I understand that two sets of bevel gears are used but I do not see how they work.

Elizabeth, N. J. A. M. MULLEN.

—The construction of the Cadillac two-speed rear axle, which is made by the Timken company, is illustrated in Fig. 4. The power is transmitted from the drive shaft to the axle shafts through the bevel gear sets, AB or CD. With the inner set the ratio is 3.66 to 1 on high gear while with the outer set the ratio is 2.5 to 1. The two large bevel gears, B and C, are riveted to the differential gear housing and the pinions, A and D, that drive them are loose upon the drive shaft. From the motor, the power is transmitted to one set or the other of these gears by means of the dog clutch members, F, E and G. The sliding sleeve, which is operated by the shifting rod, H, meshes the teeth, F and E, or F and G, depending on whether the gears, A and B, or C and D, are to be brought into action.

The rod, H, is magnetically operated and is locked into position by the spring, J.

## Horsepower Formulas Give Approximate Results

Editor THE AUTOMOBILE:—In horsepower formulas for automobile gasoline motors, cylinder diameters and stroke together with calculated revolutions are the usual factors. Would not actual indicator tests at varied revolutions under road conditions be more reliable? Such tests would show any unevenness in the balance of power in the different cylinders. The brake test will not do this.

Vallejo, Cal. S. A. COPPER.

—The determination of the horsepower by means of indicator cards gives more accurate results than can be obtained by formula but the same may be said of brake horsepower tests. However, when tests are resorted to the value of the horsepower formula is lost. The formula is merely a convenience and is only useful to give an approximate idea of what the horsepower of the motor is without going to the expense or the trouble of testing the motor. The formula is especially useful as a basis for taxation and for the classification of cars in contests. A horsepower formula is never used where accurate results are required, but a test is invariably run on the motor.

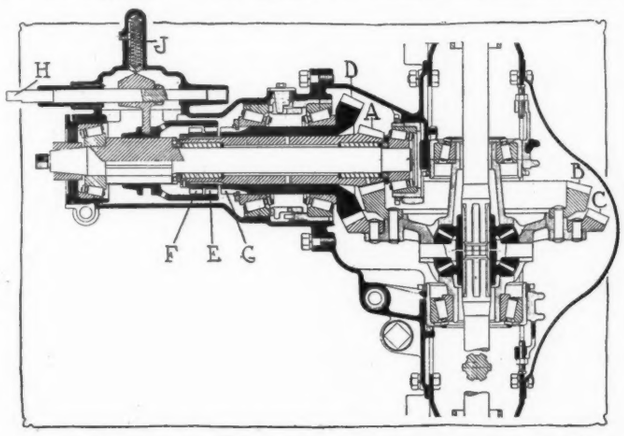



Fig. 4—Diagram showing construction of Cadillac two-speed axle

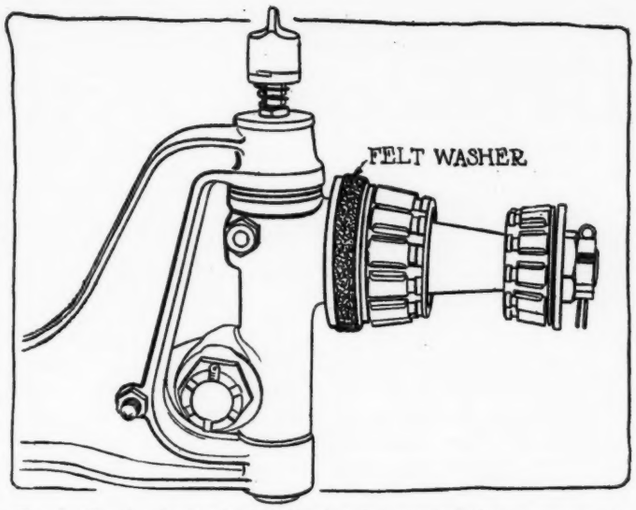



Fig. 3—Front wheel spindle, showing felt washer that prevents the escape of the lubricant

While the brake test will not show the proportion of power delivered by the different cylinders it is to be preferred, as a rule, because the testing apparatus is simpler and cheaper and because the brake test shows the power the motor actually can deliver while the test with indicator cards, which is known as the indicated horsepower test, shows the power developed in the motor cylinders and does not allow for any mechanical losses in the motor. The indicated horsepower may be as much as twice the brake horsepower.

Therefore it is seen that, if actual motor performance is desired, if the power the motor is capable of producing is wanted, then the brake horsepower test is the one that should be employed.

## How to Select Plain Bearings

Editor THE AUTOMOBILE:—In buying new bearings for an automobile with soft metal and bronze knit together it is not always easy to be sure that the two metals are knit solidly. There may be a blowhole somewhere not visible from the outside, or the contact may not be firm over the entire surface.

The best method of detecting flaws in bearings of this kind is to suspend the bearing on a string and strike the bearing with a hard clapper, as you would a bell. If the bearing gives a good clear ring it is solid. By comparing sounds emitted by bearings of the same size and of the same make you can then select the ones that are of sound construction.

New York City. W. F. S.

## Sunbeam and Peugeot Cylinder Dimensions

Editor THE AUTOMOBILE:—What are the valve diameters, bores and strokes of the 12-cylinder Sunbeam and Goux's Peugeot?

Wilmette, Ill. R. B. WHITE.

—The cylinder dimensions of the 12-cylinder Sunbeam are 80 by 150 millimeters which corresponds to 3.15 by 5.91 inches bore and stroke respectively. The diameters of the valves are not obtainable.

The bore and stroke of Goux's big Peugeot are 4.26 by 7.2 inches respectively and the valves are 1.77 inches in diameter. Two intake and two exhaust valves are fitted to each cylinder.

# Developing Automobile Engineers

## Eight Out of Forty-Seven of Our Leading Universities Have Definite Automobile Engineering Courses and Nearly All the Others Touch on the Subject

OUT of forty-seven of our principal universities only eight have a definite course of automobile engineering, and yet the need for men specifically trained in this work is so great that many of the larger automobile manufacturing concerns have established schools to supply this material. Of the remaining thirty-seven universities there are very few which do not touch to some extent on the automobile motor, but their courses in gas engine practice deal so largely with the heavier type of internal combustion engine that it is necessary for the student to reconstruct many of his ideas, should he by chance after graduation enter the designing room of an automobile factory.

Those schools which do not directly study the subject of automobile engineering, but which touch to some extent upon it deal only with the engine. The matter of the design of transmission gearing, frames, wheel mountings and the many other details do not enter into the course at all. The student of mechanical engineering when studying machine design and similar subjects will get a broad enough idea of design to enable him to apply his knowledge usefully in working out solutions for the specific problems presented by the design of automobile details, but at the same time he will lack the specialized training which would enable him to solve the problem more rapidly and with the full benefit of what has been learned in the past on this work.

### Many Automobile Schools

All over the country automobile schools have sprung up which give short courses for the use of chauffeurs, owners, etc. Among these the work of the Y. M. C. A. schools is prominent. While these courses are in many cases of great value, they do not aim to make an automobile engineer out of their graduates. They are merely for the purpose of teaching the proper handling of the finished car and its accessories, but not its design. The graduate of one of these schools would not be in any way fitted to take a position of responsibility in the drafting or engineering department of an automobile factory. The purpose of these schools is admirable and they fill a different need than that for which the graduate of an automobile engineering course in a university would be fitted. It is not to be expected that a university graduate has as an aim the driving of a motor truck after spending 4 years in a technical college.

Eight universities have a special course in automobile engineering. They are as follows: Armour Institute of Technology, Chicago, Ill.; Mechanics' Institute (for owners and chauffeurs), Rochester, N. Y.; University of Idaho, Moscow, Idaho; University of Michigan, Ann Arbor, Mich.; University of Missouri, Columbia, Mo.; University of Nebraska, Lincoln, Neb.; Virginia Polytechnic Institute, Blackburg, Va., and Worcester Polytechnic Institute, Worcester, Mass.

In addition to this there is the University of Washington, which had a course in 1910 which was abandoned but which will shortly be resumed.

Universities such as Cornell and many others which have a course of internal combustion engine design as a part of the mechanical engineering department require their students to design an automobile gasoline engine and to fully work out the details of these engines on their drawing boards. When this is done the student gets an insight into the problems which are incidental to the high speeds at which the automobile gasoline engine is required to work. This factor alone presents problems which he does not meet in the design of large stationary units or other types of gas engines, but his training generally stops there and he does not learn how the power is taken from the motor and transmitted to the rear wheels of the car. Many a graduate from a mechanical engineering school who enters the automobile business is in the position of being able to give an accurate explanation of the thermo-dynamic principles involved in an automobile gasoline motor without being able to explain the operation of the gear-changing mechanism or differential.

### Some Have Fine Equipment.

Some of the universities have gone further than establishing a mere lecture course on the subject of automobile engineering. The University of Michigan has, for instance, a full testing equipment consisting of a Diehl dynamometer having a range up to 90 horsepower and a speed range of from 500 to 2,400 revolutions per minute. In this laboratory extended tests can be made on automobile power plants. In fact, such a laboratory is not only a source of profit to the students but also to the university itself because commercial work can be carried out which will not only augment the income of the University but will enable the students to witness actual commercial tests.

At Yale University, while there is no definite course in automobile engineering, the mechanical engineering department at the Sheffield Scientific School has taken steps in that direction in the installation of an automobile testing platform, suitable for use with passenger vehicles and motor trucks. The laboratory includes many types of automobile engines which are tested during the course on internal combustion engines, but there is no department here which fully covers the specific details of chassis design.

Where such courses of automobile engineering are carried out they generally form part of the general mechanical engineering course and are one of the elective subjects which are credited toward the degree of mechanical engineer. At the University of Michigan, work has been assigned to a professor who gives 3 hours per week to the subject of gasoline automobiles, which covers the general principles of the construction and operation of the modern car, 3 hours a week to chassis theory and design, a technical course dealing with the actual design of clutches, gearsets, etc., and 2 hours a week for automobile testing, dealing particularly with the methods of making tests upon engines, transmissions, etc. In addition, the Department of Electrical Engineering has a course on the general subject of electric lighting, starting and ignition for automobiles. This course has attracted a large number of students who are qualifying for the degree of electrical engineer.

There seems to be considerable doubt on the part of the university and college authorities as to what extent the automobile industry requires the use of men who have received a specific automobile engineering education. The automobile

industry has grown so rapidly that the colleges have not kept up to the demand for these men. The fact that the automobile at its inception was regarded as a means of sport or amusement had no doubt much to do with preventing the universities from recognizing it as a solid and enduring business. Now, however, the industry requires trained men to such an extent that they are not supplied fast enough. This does not mean that the automobile engineering graduate would find his services in demand as chief engineer of a prosperous automobile concern, but it does mean that he will be able to enter the drafting room of one and by steady normal growth, which will be proportional to his own innate ability, forge ahead to a responsible and remunerative position.

The very fact that automobile engineering graduates are required will make a position for one, trained in the theory as well as the practice of this subject, on the faculties of the university giving such a course. The point which cannot be lost sight of is the fact that progress is being made so rapidly in this industry that it requires the most progressive men in the faculties in order to keep up with the progress of the times and at the same time to remain efficient in their instructive work.

### Delivery Service a Fine Field

Another field in the automobile industry which requires trained men is that of the delivery service. A man who has charge of a large fleet of motor vehicles must have at his finger ends knowledge which cannot be gained in any other way than by a technical study of the vehicle which he has to handle. The efficiency of his department depends to an enormous extent upon his personal knowledge of the economical handling of a motor truck. In the matter of his choice in the selection of the size of vehicle to do the particular work required will depend the loss or gain of thousands of dollars to his employers. The size tires he buys, the quality of men he employs, the speed at which he permits his vehicles to be driven, the load placed on his vehicles and a myriad of other factors which it is true can be learned by bitter experience might better have been a part of his fundamental education.

It is to fill this need that the many automobile schools have sprung up, and the fact that these schools find hundreds of eager students all over the country show that the need is recognized. To meet this need universities such as that of Idaho and the Mechanics' Institute of Rochester, N. Y., have given special short courses. It is also to meet this requirement that the Society of Automobile Engineers has established an associate grade of membership through which those interested in delivery and other automobile problems may hear discussions on these subjects.

Many of the automobile factories have testing work to do which they are not able to accomplish in their own factories. This type of testing is known to them as research work, and goes more deeply into the technical details required than does the ordinary commercial testing which establishes little except the horsepower of the motors at different speeds. In this work in other industries factories have come to rely on the universities to carry out their testing work. In the automobile industry the engineering departments do not find laboratories which are so fully equipped at the nearest university and as a result they have to send this work elsewhere.

### A Suggestion for the Colleges

Technical colleges which are near automobile manufacturing centers would find that the expense of establishing a research laboratory, which is largely the greatest expense connected with establishing a course in this subject, would be repaid to a large extent by the willingness of the neighboring plants to co-operate by arranging some reciprocal base for the use of the laboratory. At the present time the available laboratories are too widely scattered.

## Truck Makers and Users Say Safety Fenders Are Useless

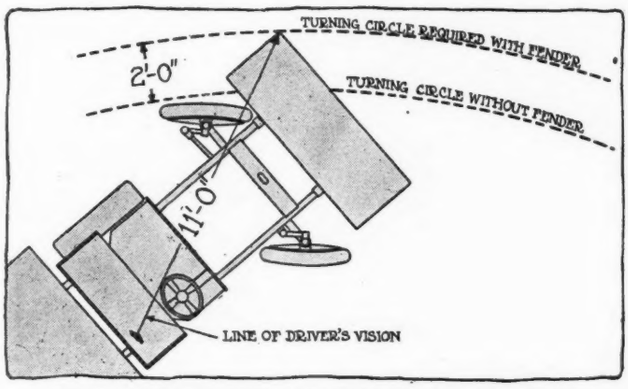
AGITATION against street accidents led to the passage of ordinances in Chicago and Detroit last year requiring the attachment of safety fenders to motor trucks and to proposals in Milwaukee and Cleveland to enact similar ordinances. Other cities are considering the same question, and there is danger that unless action is taken to inform city councilmen of the facts regarding such fenders and their use there will soon be many ill-advised city ordinances that will be a source of expense and annoyance to motor truck makers, dealers and users without resulting in any compensating good to the general public.

An investigation has been made among truck makers and users in Detroit and truck dealers in Chicago by the National Automobile Chamber of Commerce to find out how the ordinances in those cities are working and what is the consensus of opinion as to the practicability of using fenders on trucks for purposes of safety.

Out of more than a score of responses to inquiries, not one is favorable to the use of fenders; on the contrary, they are almost unanimous in pointing out the uselessness of such devices and the probable increase of accidents that would result from their use. Both the Chicago and Detroit ordinances were passed, notwithstanding there was not in the market any fender that had been proved effective or that could be produced in sufficient numbers within the allotted time to equip all the trucks in service.

As a consequence, the Chicago ordinance is not being enforced and truck dealers and users have not been notified to comply with it, but a traffic commission is to study the whole question of street congestion and accidents and recommend relief measures. In Detroit the users of trucks have attempted to comply with the ordinance, but the police commissioner extended the date of enforcement from November last to January 1. No type had won approval. The commissioner says that up to date there has been no perceptible falling off in the number of accidents as a result of fitting trucks with fenders.

The principal criticisms against the use of fenders are that they are as likely to cause injuries and death as to prevent them, they add to traffic confusion, they become damaged and inoperative, no satisfactory and effective type of fender is known to truck makers and users, and there is no need for them.




Illustrating the amount of clearance required with fender and without

# Accuracy a Zenith Feature

## A Picture Story of Carbureter Manufacture

THE manufacture of the carbureter is a highly specialized art. It has developed along with the rest of the industry and special factories making only this one part have grown up. Within them is found machinery for quick and accurate manufacture which is on a par with that of any other manufacturing plant.

In the new Zenith factory, in Detroit, for instance, where 200 carbureters a day are made, the visitor sees many special machine tools, unique methods of quick manufacture and commendable operative efficiency. Here, as in other well-managed plants, accuracy must not be and is not sacrificed at the altar of quantity. Each carbureter must undergo exceedingly rigid inspection throughout its several stages of growth from the raw materials; each nozzle must be as accurate as watchmakers' tools and exhaustive tests can make it; each hole drilled in body or mixing chamber must be correct; the float must perform its duty with the minimum of variation.

Some of the very interesting factors entering into this specialized manufacturing at the new plant have been caught by the camera and are shown herewith. They give some hint of how quantity and accuracy are inter-linked.

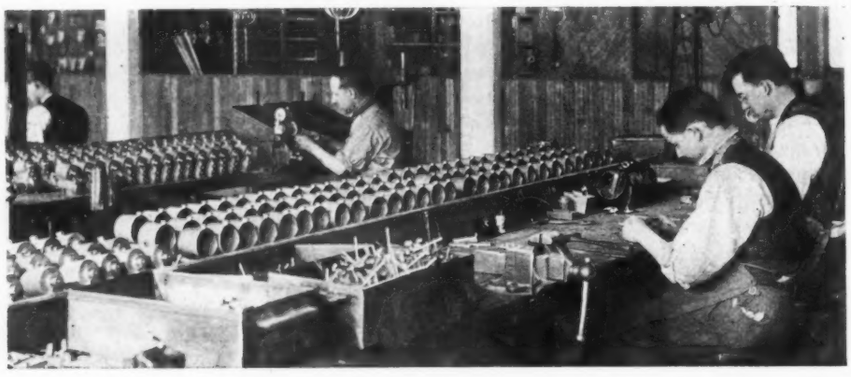


Fig. 1—Several hundred Zeniths in the making. A view in the assembly department showing a line-up of partially finished carbureters ready for the fitting of floats and so on. Each assembler has a vise to hold the instrument in the making and the parts ready for fitting are contained in steel trays before him. Thus he is able to give his entire time to the work before him.

By such methods as these the labor cost is kept at a minimum.

Fig. 2—Multiple spindle drills used for drilling all of the holes in the barrel or air passage of the carbureter. The part is placed in the jig which then accurately locates the drill points for all twelve holes to be drilled. There are almost as many sizes of drills as there are holes, and they are so arranged that the drilling of all holes with one side of the jig in position can be done at one operation, the other drills not interfering. It takes 2 minutes and 20 seconds to set up the piece and drill the twelve holes.

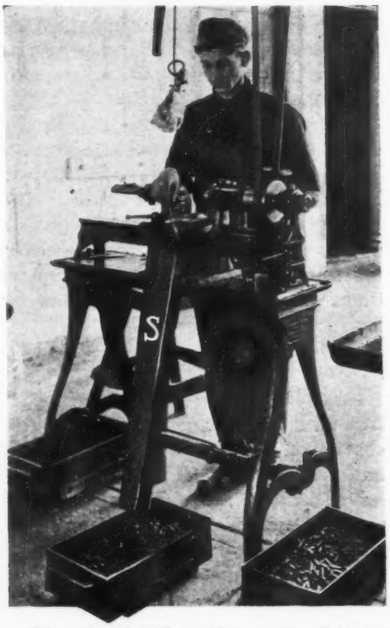



Fig. 3—Drilling the main jets at the rate of 1200 a day, or two per minute. These jets come to the lathe man from the automatic machine which finishes the outside, but the inside must next be drilled. A small chuck grips the piece quickly, and the drilling is simply a matter of pressing the chuck and nozzle against the drill. To save the operator's time in disposing of the pieces which he has drilled, the chute S is provided which directs them into a tray below.

This is another example of how well the production methods have been worked out in the Zenith factory and shows the importance of paying attention to the details.

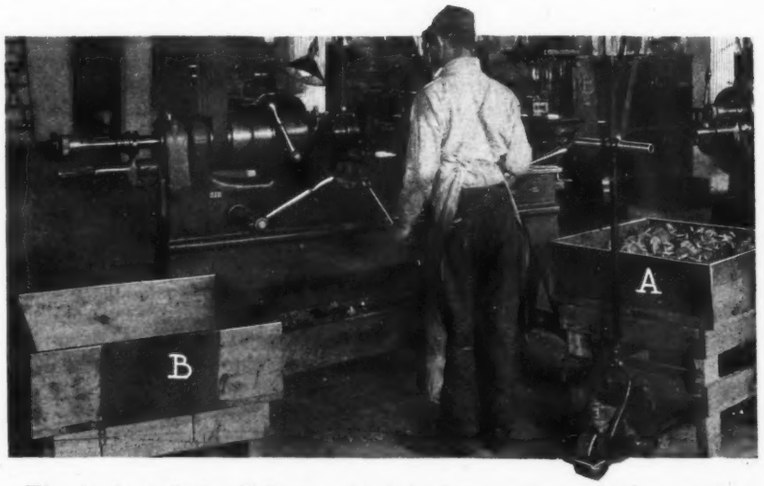



Fig. 4—A study in efficiency. At A is shown a box of pieces ready for machining. At B is seen another box ready to receive the finished pieces. The truck can pick up any of the boxes in the factory. Thus the minimum time in handling is effected.

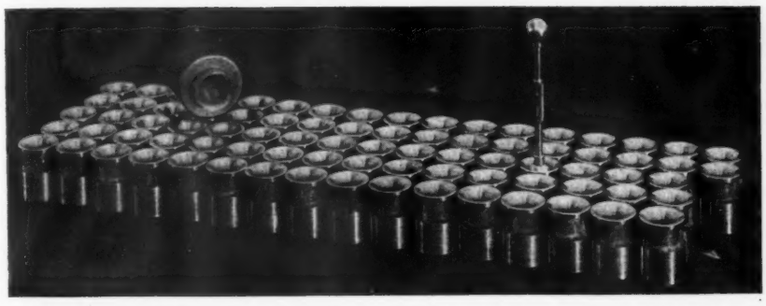


Fig. 5—The air nozzle inspection. The air nozzle in the venturi tube of the carbureter must be accurate. The ball gauge method of determining this accuracy is employed. A long row of nozzles is placed on the bench. The "go" end of the ball gauge must slip through the nozzle, while the "no go" must not. The "go" end measures .7851 inch, while the "no go" end is .7898 inch. Thus there can be a variation of plus or minus of about two thousandths. At the left is seen the ring gauge which must slip over the end of the nozzle without any play.

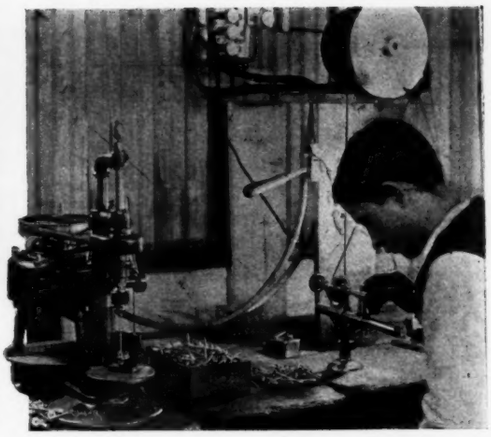


Fig. 6—In the drilling of the spraying nozzles, great care must be taken to have them absolutely accurate and uniform. Two jewelers' lathes are used, the one on the right serving to center the nozzle, while the small drill placed on the left is used to complete the operation.

Fig. 7—Delicate lathes in a carbureter factory. Gasoline being extremely volatile can only be controlled by microscopic accuracy in the needle valves and the size of the hole in the spraying nozzle. This fine drilling must be accomplished on special jewelers' lathes where the small parts can be turned and tooled to as close an accuracy as human ingenuity can devise.

The above illustration shows part of the equipment installed by Zenith for the careful machining of needle valves which control the flow of gasoline from the float chamber. The work is so fine the operator requires a magnifying glass.

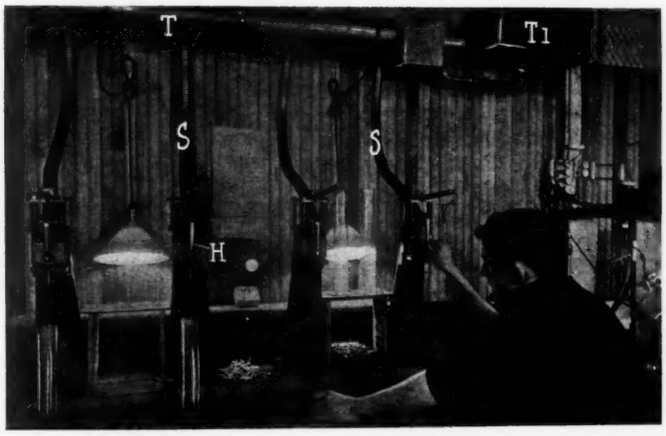



Fig. 8—Although the spraying nozzle holes are drilled with greatest care, yet they sometimes vary slightly. They are tested by means of a flow of water through the nozzle under a given pressure and in a given time.

The water is maintained under a constant pressure in tank T, the tubes S to the nozzles being of large size for free flow. The clamps H lock the nozzles in position and prevent leaks. In order that the level in tank T will always be constant, it has no direct connection with the water supply. The tank T1 receives the water.

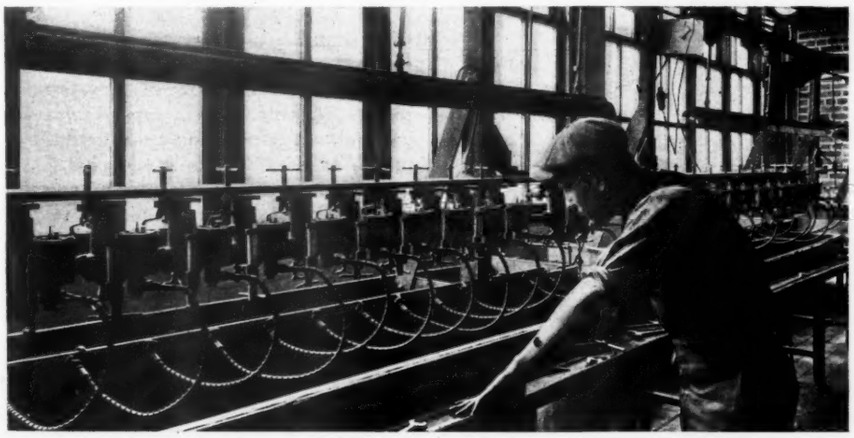


Fig. 9—Each float is plunged into hot water to test for leaks, the hot water heats it and expands the air within, and if there is a leak, bubbles appear. Next the floats are assembled in the float chambers and then are placed on the testing rack shown above. A gasoline gauge glass is temporarily attached to each instrument to indicate the level. The float should occupy a certain position with respect to this level and the performance of each carbureter is carefully noted and corrected in this way. The gasoline is under considerable head being carried in a tank which is about 6 feet above the testing bench.

Fig. 10—Shipping box for local delivery. The cover has rubber strips on its inner side which press against the instruments and hold them in place when hooked down.

# Stewart-Warner Vacuum Fuel Feed

## Fuel Fed from Rear Tank to Carbureter by Motor Suction —Device Attached to Dash

THE vacuum-gravity gasoline fuel feed system brought out by the Webb Jay Motor Devices Co., Chicago, Ill., last fall, and which was described briefly in THE AUTOMOBILE for October 16, has been taken over by the Stewart-Warner Speedometer Corp., Chicago. The device as it will be manufactured by the Stewart-Warner company has been refined in detail, although the principle of operation is the same. In this system the suction of the motor is employed to draw the gasoline from the fuel tank to the carbureter, and with its use the tank can be located at the rear of the car the same as with the pressure system. The system comprises a float tank, attached to the dash, and two pipes, one of which runs from this tank to the intake manifold, while the other runs to the fuel tank. It is claimed that with this system all the advantages of the pressure system are obtained with very little more complication than is found on the ordinary gravity feed.

### Fuel Tank in Rear

In common with the pressure system it has the advantage of the gasoline tank hung at the rear, yet it avoids the complication of the former by doing away with all pumps, gauges and reducing valves. Not even an air-tight tank is required and the use of a filter is rendered unnecessary by the special construction of the device.

The actual construction of the mechanism is well illustrated in Fig. 1. It is completely housed in the brass tank shown in this figure. From this tank the pipe, A, leads to the intake manifold and the pipe, B, runs to the gasoline tank. The tank is divided into two chambers, the upper one being subjected to the suction of the motor whenever the valve, C, is open. The opening of this valve, and, consequently, the level of gasoline, is controlled by the float, as will be explained later in the description.

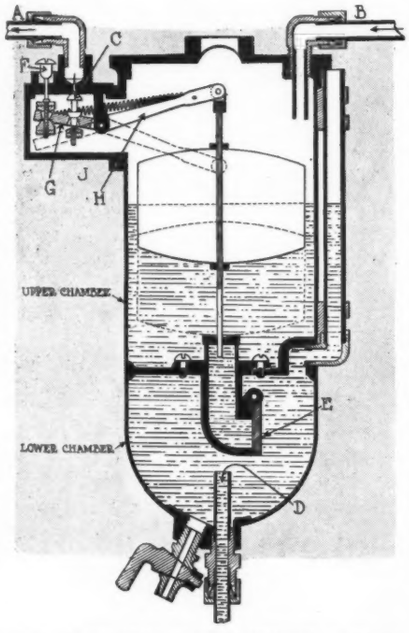



Fig. 1—Vertical section through vacuum tank used on Stewart-Warner system

From the lower chamber gasoline flows out through the pipe, D, to the carbureter. The passage of the fuel from the upper to the lower chamber is by gravity through the flap, E.

The construction of the mechanism is such that whenever the suction valve is closed the upper chamber is raised to atmospheric pressure by the opening of the valve, F. This is necessary in order that the gasoline may flow freely from the upper to the lower chamber as a slight vacuum in the upper chamber would prevent the opening of the flap valve, H.

The float is designed to be intermittent in its operation. When the level of gasoline drops to a certain point, the float falls, the suction valve, C, opens and the atmospheric valve, F, closes. The suction of the motor then causes a flow of fuel from the gasoline tank through B. Then, when the level rises to a predetermined height, the float returns to its upper position. It takes about 2 seconds for the chamber to become full enough to raise the float—.05 gallon being transferred.

The atmospheric and suction valves are controlled by the two levers, G and H, both of which are pivoted at J, their outer ends being connected by two coil springs, only one of which is shown in the illustration. It is seen that the arrangement of these two springs is such that the float must be held at the extremity of its movement. It cannot assume an intermediate position. The lower position of the mechanism is shown by the dotted lines. It will be noted that the movement of the float mechanism is so large that no adjustment is needed on the valves.

The pipe running from the bottom of the lower chamber to the carbureter extends up into the chamber, so that there is little chance of dirt or water being carried to the carbureter. A drain cock is provided to the left of this pipe for cleaning out dirt. This feature also gives a ready means of obtaining gasoline for cleaning or for priming the cylinders.

### Few Parts to Wear

Great durability is claimed for this device because there are few parts to wear. The springs are made out of No. 28 gauge bronze and have a stretch of only .125 inch, so they should last a lifetime.

The only time that the vacuum can become so low that it will not draw gasoline from the rear tank is when the tank pressure is below 4 ounces, and this condition can exist only when the motor is running below 600 revolutions per minute with wide open throttle. In actual practice a car is never operated under these conditions long enough to exhaust the supply of fuel in the tank. Running with open throttle below a speed of 600 revolutions per minute means that the motor must be laboring up a hill, and as this is detrimental to the motor the Stewart-Warner system acts as a safeguard.

### Float Tank Quickly Filled

If the car is allowed to stand long enough so that the tank becomes empty it will be replenished after the motor has been cranked over four or five times with the throttle closed.

The installation of the Stewart-Warner vacuum-gravity system is very simple and can be accomplished in a short time without the use of any special tools. The pipe, A, is tapped into the manifold at a point as near to the cylinders as possible, while the pipe, B, is inserted into the gasoline tank and runs to the bottom. There is a check valve in the pipe A to prevent any trouble due to backfiring. Since the fuel is sucked from the gasoline tank, the filler cap need not be air-tight but on the contrary should be provided with a small vent. The float tank is bolted to the front side of the dash.

—

## Denatured Alcohol Popular in Germany

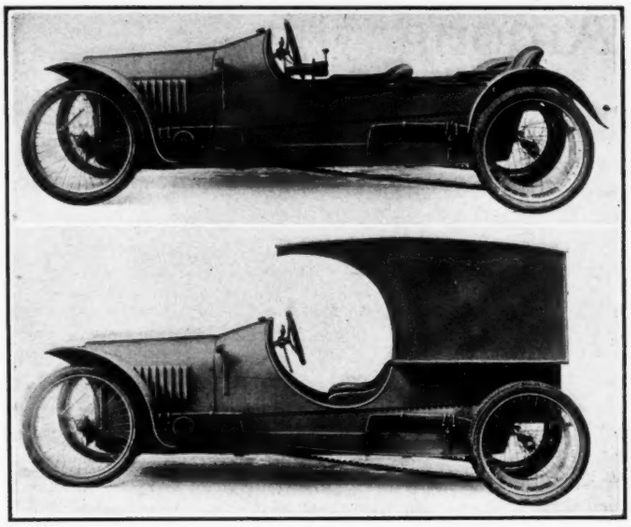
Germany now uses between 40,000,000 and 50,000,000 gallons of denatured alcohol a year, of which over 30,000,000 gallons are sold to the general public for burning purposes. The importance of this fuel in Germany may be appreciated when it is considered that France uses about 18,000,000 gallons, the United States about 10,000,000 gallons, and the United Kingdom only 4,000,000 gallons. Denatured alcohol is not only gaining in favor for general burning purposes, but a determined effort is being made to find a way of using it as a motor fuel in place of the high-priced gasoline.

# O-WE-GO Cyclecar Has Tandem Seating

ONE of the most recent additions to cyclecar ranks is the O-WE-GO, manufactured by the O-WE-GO Cyclecar Co., Owego, N. Y. It is offered in both tandem and delivery styles, and is equipped with a two-cylinder, air-cooled V-motor, a friction transmission and a V-belt drive without differential. The wheelbase is 104 inches, the tread 36 inches, and the weight 600 pounds, with passenger body. Wire wheels with 28 by 3.5-inch tires, and cantilever springs are employed. The equipment is complete, including electric lights, windshield, horn and tools. The passenger car sells for $385, while the delivery car lists at $405, with full panel body.

The motor has a bore and stroke of 3.375 by 3.75 inches and develops 12 horse power, it is stated. Atwater Kent ignition is used and lubrication is by force-feed. The cylinder, cylinder head and valve chambers are cast in one piece and the pistons are fitted with three rings. Roller bearings are employed on the crankshaft and connecting rods.

The transmission is mounted on a frame separate from the motor, and both wheel and disk run on ball bearings. The wheel is faced with fibre moulded under a pressure of 50 tons. The control has been well worked out. Both spark and throttle levers can be manipulated without removing the hands from the wheel. The change-speed lever is located directly below the wheel. The left pedal engages the friction members and the right one operates the expanding brakes on the rear wheel drums. An accelerator pedal is also provided.

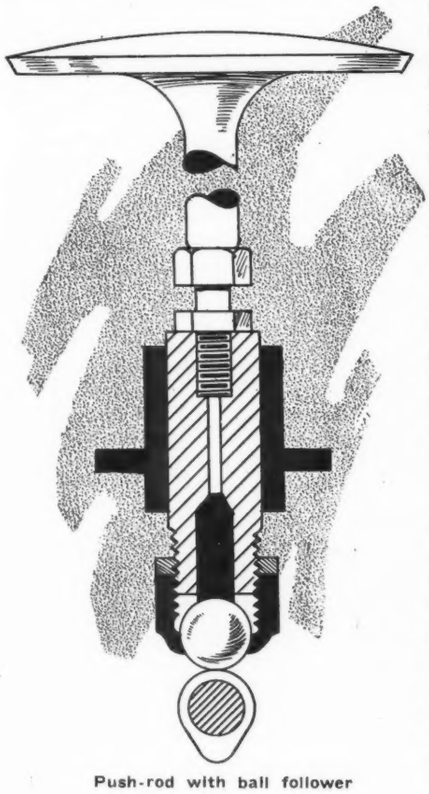


The O-WE-GO cyclecar with tandem and delivery bodies

The lighting equipment includes two 6-inch headlights and a tail light, and the system is provided with a dimming switch for city driving. The current is furnished by six dry cells. It is said that 40 or 50 miles can be obtained on a gallon of gasoline and that the speed of the car is 45 miles per hour. The spring suspension has been well worked out and therefore the car rides well and holds the road at high speeds, it is said.

## New Push-Rod Has Ball Follower

YORK, PA., March 28—A new type of cam follower has been patented by Fred Fisher of this city. The feature of this device is the substitution of a ball and socket for the cam roller, or mushroom shaped tappet end usually employed. It is claimed that this construction, which is shown in the accompanying illustration, is superior to the roller and pin because there is very little chance for wear. With the roller and pin, the pin becomes loose in time and noise results. The ball is free to turn around in its socket so that it will wear evenly. With the use of this form of tappet end, the cams should be ground to fit the ball radius so that the ball can have sufficient bearing surface. Great quietness is claimed for it.



Push-rod with ball follower

## Wind a Factor in Cyclecar Design

Though one build a cyclecar for touring, he must remember the wind, and this is one of the greatest arguments for tandem seating that advocates of this type put forth. With a side-by-side car a 9-horsepower motor will have a hard time pulling a windshield and top against a 30-mile wind. These cars will need bigger motors for this work. With the tandem, streamlined, and with the small type of top and windshield they use, a 30-mile wind is nothing.

Given 10 square feet of area on a side-by-side seater, and it will take from 9 to 12 horsepower to drive the car 20 miles an hour against it. In the narrow types with narrow tread, 4 square feet of wind resistance is all that is necessary, and a 9-horsepower motor can safely handle the car.

The cyclecar is a new vehicle. It needs new engineering. It needs designers who are rational and posted and yet who are unprejudiced by previous practice. It needs aeronautical engineering, motor-car engineering, art engineering, pressed steel engineering, metallurgy, mathematics and all the brains that can be combined to produce a maximum-efficiency car. Given this performance and looks and it is bound to be a low-priced, reliable car and a salable proposition.

DENVER, COL.—A campaign to mark the automobile roads throughout Wyoming with signboards will be started at once by the Sheridan Motor Club. This was announced a few days ago by Dr. F. M. Stahl, a member of the Sheridan Club, who called upon Denver good roads promoters on his way home from a tour to the Pacific coast. Dr. Stahl said he and other Sheridan motorists were greatly impressed by the signboards put up in Colorado by the Denver Motor Club and in California by the Auto Club of Southern California, and that they intend to bring the matter before all the motor clubs and good roads organizations in Wyoming, and also call upon the county commissioners and the Wyoming State Highway Commission for assistance in this matter.

# Among the New Books

## Works on Testing Materials, Power and Transportation, Oil Fuel, etc., Among Spring Offerings

THERE are many publications coming from the press this spring which will make interesting reading for every one in any way connected with automobiles or the automobile industry, including, of course, those who follow developments in the commercial vehicle field. The books which are briefly reviewed on this page will give an idea of the wide scope and thoroughness of the study which is being applied to all phases of the motor vehicle industry at the present time. There are technical books, touring books, handbooks of information, laboratory manuals and works on electrical subjects. Some of the most interesting of the spring publications of this character are described below:

THE ELECTRIC VEHICLE HANDBOOK, by H. C. Cushing, Jr., Fellow of the American Institute of Electrical Engineers, and Frank W. Smith, Vice-President of the Electric Vehicle Association of America. Published by H. C. Cushing, Jr., New York City. Cloth, 4¼ by 6⅝ inches. 356 pages, illustrated.

The object of this handbook is to set forth clearly the fundamental principles in the operation, care and maintenance of electric vehicles, their batteries, tires, motors, controllers and accessories. The subject matter of each chapter has been compiled with the assistance of David F. Tobias, E.E., and other experts. The opening chapter by William P. Kennedy is on electrical vehicle development and summarizes in a concise, interesting manner the development of the electric vehicle.

Then lead storage batteries are described and illustrated, and information and directions regarding them are given, together with complete tabulations of battery data. Then the subject of charging is taken up thoroughly and illustrated by charts showing variations in discharging. A special chapter is devoted to battery accessory suggestions. The work then goes on to treat of commercial types of lead storage batteries, alkaline batteries, especially the Edison.

Charging apparatus and stations are given careful attention, and also the various electrical and mechanical types of current-measuring instruments. Tires and load weights, the electric motor and controllers, together with other information, render the work an unusually valuable handbook on the subject.

THE REGULATION OF MUNICIPAL UTILITIES, by Clyde Lyndon King, Ph.D., published by D. Appleton & Co., New York City, 404 pages. Cloth, $1.50 net.

This work covers the whole subject of municipal franchises, discussing in turn the need of regulation, the purposes of public service commissions, the problems that have to be grappled with, the results of the work of commissions in various cities, arguments for and against municipal ownership, etc. A number of prominent men have contributed to the book. The arrangement is such as to give the reader not only a clear view of the principles involved, but also a résumé of the experiences of the different communities in dealing with this question.

LABORATORY MANUAL OF TESTING MATERIALS, by William Kendrick Hatt, C. E., Ph. D., and H. H. Scofield, M. E., published by the McGraw-Hill Book Co., New York City. Cloth, 135 pages, illustrated.

The manual is the outcome of the operation, through 18 years, of the testing materials laboratory at Purdue University, Lafayette, Ind. The purpose of the work is to serve as a guide to the student and to relieve the instructor from the necessity of explaining the details of mechanical procedure, and so to free his time for matters of greater educational importance. The first few chapters of the book are devoted to definitions and a discussion of the various materials to be tested. Then the technical qualities of materials and the subject of testing machines is taken up in a general way. Following this are several chapters on the calibration of the machines and detailed instructions concerning the testing of materials. The rest of the book is given over to an appendix which contains common formulas, strength specifications of iron and steel, standard forms of test pieces and strength tables.

THE PRINCIPLES OF THE APPLICATION OF POWER TO ROAD TRANSPORT, by H. E. Wimperis, M. A., M. I. E. E., published by Constable & Co., London, England, 130 pages, illustrated with half tones and zinc etchings. Cloth, $1.10 net.

This book treats in an exhaustive way the application of power for transportation on roads, and, while the title is a general one, most of the space is devoted to the gasoline automobile. Methods for calculating the indicated and brake horse power are given and for obtaining the amount of power that will be used up by any given type of vehicle at a given speed.

FINDING THE WORTH-WHILE IN EUROPE, by Albert W. Osborne, published by McBride, Nast & Co., New York City, 240 pages and thirty-one half-tone illustrations. Cloth, $1.40 net, postage 12 cents.

This book is invaluable to the tourist who wants to go to the places in Europe that are different—to see the things that distinguish any particular locality from the rest of Europe. The most beautiful lakes in Europe are in Italy, therefore those of England are subordinated while the important English features, the quaint villages, etc., which are peculiar to England, are described.

THE MECHANICAL WORLD ELECTRICAL POCKET BOOK for 1914, published by Norman and Remington, 308 North Charles Street, Baltimore, Md., 240 pages and dated diary. Cloth, 25 cents.

In British shops the appearance of this little handbook has come to be regarded as an annual event. This year many new features have been introduced. This includes up-to-date sections on telephones, marine equipment, magnets, dry batteries, etc. The section on electricity in coal mines has been rewritten and several other important parts have been revised and brought up to date. The book contains a mass of valuable electrical data.

MOTOR CAR MECHANISM, by W. E. Dommet, published by Scott, Greenwood & Son, London, England, 190 pages liberally illustrated. Cloth, 78 cents net.

This book is intended as an elementary text-book for those students who want a general knowledge of motor car construction of the present day, and who intend to take the allied subjects of mechanics, mathematics and machine design. Examples of the various parts entering into the construction of a motor car are given, and, in addition, there are several chapters on the determination of horsepower, valve design, etc.

OIL FUEL, by V. B. Lewes, F. I. C., F. C. S., published by Collins' Clear Type Press, London and Glasgow, 262 pages. Cloth, 25 cents net.

This is a non-technical work that is designed to appeal to the person that desires a knowledge of the subject yet has not time to study it deeply. The opening chapter takes up the formation and composition of petroleum, then the distribution of oil is discussed. Following are chapters on the recovery and refining of petroleum, the storage of oil, liquid fuels other than petroleum, the combustion of oil, and the book closes with a discussion on the production of power by petroleum.

# Berling Magneto Low-Priced

## Made by Ericsson Mfg. Co., Buffalo — Featured by Small Size, Low Price and Simplicity

A HIGH-TENSION magneto, for four-cylinder motors, that is distinguished for its small size, low price, and simplicity, has just been brought out by the Ericsson Mfg. Co., Buffalo, N. Y. This concern has been a large producer of various forms of electrical apparatus for years, and has made motorcycle and motorboat magnetos for some time, so it is not surprising to find many interesting and commendable features in the construction of its newest product.

The Berling magneto, as it is called, differs in many respects from the ordinary high-tension magneto, although none of the features can be called radical. The timing gears are located at the front end instead of the rear, as is usual, and the distributor is placed inside the magnets, thus being exceptionally well protected from oil and moisture. The high-tension cables are brought out from the distributor in such a manner that they do not come in contact with any metal parts, and, therefore, the high-tension wires are doubly protected against short-circuits.

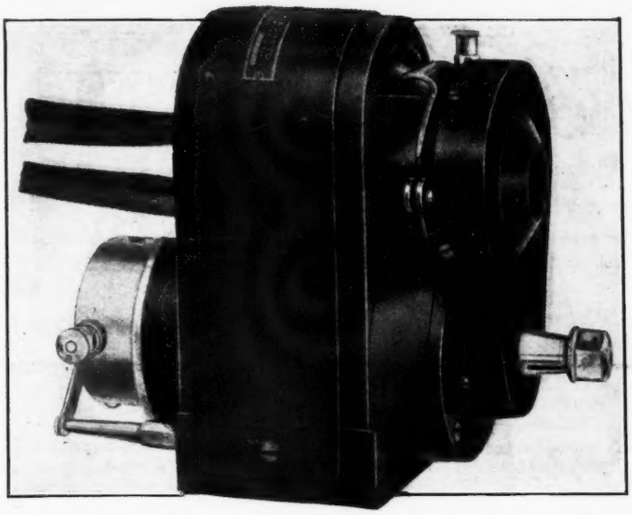
### Design Well Thought Out

The design of the interrupter, or breaker, has been carefully thought out. The cams which operate the interrupter are made integral with the interrupter housing, and, therefore, cannot come loose. As there are no binding posts on the housing cover the interrupter can be inspected while the engine is running, in order to ascertain if it is working properly.

Ease of adjustment is a special feature claimed for the Berling interrupter, this being accomplished by loosening an ordinary screw locking the platinum screw. The latter has a hexagon head and is easily adjusted with a combination wrench and gauge provided for this purpose.

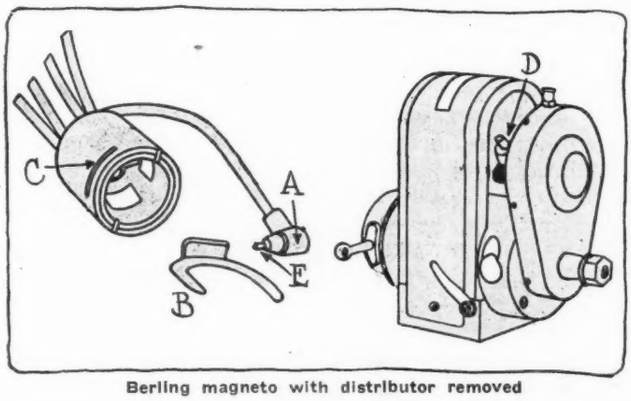
A magneto is necessarily exposed to excessive jarring, and it is therefore important that all parts be securely fastened together. In this magneto the frame is one solid unit; there are no screws in it to become loose and permit wearing or rubbing. The solid frame construction also aids in making the magneto oil and waterproof.

While this magneto is small it is very efficient and is capable of producing a spark .1875 inch in length at 75 revolutions per minute, it is said. This remarkable performance is due to the design and material employed. An extremely small air gap is used between the armature and the pole shoes, it being about .005 inch. This calls for accurate workmanship on both armature and magnets. Another reason for such a strong spark at a low speed is the accurate proportioning of the armature windings and condenser with reference to the field strength.



New Berling high-tension magneto for four-cylinder motors

Accessibility is a feature. This is not only evident in the breaker mechanism, but in the distributor construction as well. The distributor can easily and quickly be taken out from the rear, whenever it is necessary to examine the connections or clean the brushes, and no tools are required. First the high-tension terminal (A) at the side of the interrupter box is removed and then the curved metal piece (B), set in from the top, which locks the distributor in place, is taken out. The distributor (C) can then be taken out, exposing the brushes (D )and (E).




Berling magneto with distributor removed

## U. S. and British Production Contrasted

(*Continued from page* 726.)

a certain amount being spent per chassis, the cost of the experimental chassis, design and drawing, patterns, etc., spread over such a small quantity of chassis, as well as other points

An idea as regards the net assembly costs of various components on the 15-horsepower car above mentioned will perhaps not be out of place. This is of the four-cylinder type, in quantities of 500, produced in batches of 50 at a time. The net engine assembly labor approximates $18.75. The rear axle assembly approximates $3.75. The chassis assembly, which includes the building of the frame, approximates $27.50.

Regarding the most of raw material, one or two items, purchasing in lots of 500, may be of interest. Swivels approximate 81 cents each; a front axle, which is of course only the center piece without the swivels themselves, costs $3.80.

In order to show the difficulty of producing several types of automobiles in the same factory, a curve, No. 1, will demonstrate how the quantity production varies from month to month. The theoretical argument in connection with this is that of course the quantity production will vary, but as it costs more to manufacture one type of chassis than another, the production values, if set out in curve form, will be absolutely uniform. This does not follow it at all, as due to the variations caused by scrap, difficulties in production, etc., cropping up, the curve has alarming side slips. This is demonstrated in a curve, No. 2, which deals wholly with values.

The Automobile

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# Farmers Lead in Australia

EIGHTY per cent. of the cars sold into New South Wales, one of the most prosperous divisions of the commonwealths of Australia, are sold outside of the cities, going as they do largely to farmers and stock raisers. Some of the rich agricultural states in the United States of America have been heavy consumers of motor cars, a direct compliment to the business acumen of the farmers in these states. Other continents are developing similar types of agricultural economist.

Australia has been a market over which many American makers have gloated for several years, and it is a market that has been creditably developed by many of our cheap and medium-priced cars. The Australian business has been a relatively easy one to develop, business being done on Anglo-Saxon lines and largely by men who previously handled European cars and added American lines because of the attractive price.

In New South Wales today the small European car is seen more in cites like Sydney and Melbourne, whereas the American car has conquered the rural sections, the higher price of the European product with its better bodies appealing to the city folks, whereas the American car has caught the eye of the large stock-raising communities, and the well-to-do farming classes.

While five or six American makes lead in New South Wales registration, the entire conquest of this section cannot be considered complete, for Germany, England and France are not surrendering the field easily. They are reducing prices and raising quality, and are making dangerous inroads in some parts of Australia as proven by the decrease in percentages of certain makes of American cars, that are rather heavy for rural work in Australia. Australia wants a good, cheap, light car. The great grazing sections demand a reliable car, one that can be depended upon in long cross-country trips where garages are few and spare parts a long ways off. This condition emphasizes the necessity of American makers of low and medium-priced cars putting not only the best materials but the best workmanship into their products. These cars are more on the frontiers than the costly machines, and consequently more is expected of them. Australia only knows the American industry through the cars listing under $1,500.

# Deferring Evil Days

PUTTING off until tomorrow what we ought to do today is poor policy. It is easy policy; looks valuable at short vision; but is business suicide when surveyed from the distance where the true perspective is apparent. None of us is perfect, the ground on which we stand today is not the high plateau from which you look over the range of peaks beneath you, but rather one step in the staircase, the top of which is yet beyond our vision.

Procrastination is more than the theft of time, it becomes the theft of the treasury, the theft of success. What company has not clung too long to an old design. To all it looked better business policy to keep on manufacturing and marketing the old than to launch out into the new. Conservatism is generally commendable but when cherished too long becomes the prison door.

Many large corporations are reluctant to change. Alterations to them are considered signs of weakness. They will not acknowledge to the world that they, too, change, that their old stock must be discarded as well as the product of the cheaper maker. It takes a brave man to acknowledge errors, to accept the verdict of progress, that his conceptions of 5 or 10 years ago are but stages in the evolutions of the automobile, that they live for a time, play their part and then must take their place in the irrevocable past.

Improvements delayed have worked havoc with many in the past. History will repeat itself. A name will not carry you through any crisis today. This is a practical age. Today quality of merchandise, and merchandising principles win. It is not a day of names, not a period when we live long on reputations, but when the effort of each day is needed coupled with the concentrations of the entire organization to lift you to the next step in the staircase, before all available room on it has been occupied by your hustling rival. This is not an age or an industry of drones. Such are with us, but one by one their names take place only in history, they cease as active forces which have a power in forming the scope and tendency of the industry.

# Exports to Hawaii, $128,945, in January

## Shipments of Cars to All the American Colonies Show an Appreciable Increase, Excepting to Porto Rico—Statistics on the German Industry Come Out for First Time

WASHINGTON, D. C., March 28—Figures have been compiled by the bureau of statistics showing the shipments of motor cars to the non-contiguous territories of the United States during certain periods. During January last three cars, valued at $2,025, were shipped to Alaska, while none were shipped to that territory in January a year ago. The shipments for the seven months' period ended January increased from five, valued at $8,050, in 1913, to 19, valued at $17,089 in 1914.

Shipments of cars to Hawaii increased from 72, valued at $151,492, in January, 1913, to 119, valued at $128,945 in January last, while during the seven months' period the shipments decreased from 411, valued at $691,961, in 1913, to 337, valued at $494,185, during the present year.

Thirty-eight cars, valued at $43,031, were shipped to Porto Rico in January last, while during the same month of last year the number was 46, and the value $55,221. During the seven months' period the number decreased from 215, valued at $264,576, in 1913, to 178, valued at $211,337, in 1914.

American-built motor cars are becoming popular in the Philippines, for the returns show that the number shipped there increased from 52, valued at $49,465, in January, 1913, to 80, valued at $75,309, while during the seven months' period the number increased from 271, valued at $321,762, in 1913, to 417, valued at $522,805, in 1914.

## Germany Has 49,760 Passenger Cars and 7,581 Trucks

WASHINGTON, D. C., March 31—Some interesting statistics on the automobile industry in Germany have recently been furnished the Department of Commerce from one of its European consuls. The statistics show that on January 1, 1913, there was in the German empire a total of 49,760 passenger cars and 7,581 motor trucks, giving a total of 57,341 vehicles.

The statistics further show that in 1911 there were 131 automobile factories in the German empire which employed during the year 28,694 persons with an aggregate salary for the year of $10,723,566.

The output of automobiles for 1911 was 11,692 complete cars and 5,247 chassis. Of the 11,692 complete cars 10,319 were passenger cars and 1,375 freight cars. A further division of the passenger cars made for the year shows the horsepower division as follows:

| | |
|---|---|
| 6 Horsepower and under | 4,504 |
| 6 to 10 Horsepower | 4,269 |
| 10 to 25 Horsepower | 1,333 |
| Over 25 Horsepower | 213 |

An analysis of the motor trucks made for 1911 shows that 301 had a carrying capacity of 1 ton and 1,072 of over 1 ton. The total value of 1911 production, which in addition to motor cars and motor trucks included 3,901 motorcycles, and 1,079 cyclonettes, was $38,796,856. The value of the 1912 production has been estimated at $47,600,000.

In 1911 there were 18 factories engaged in the manufacture of tires for motor vehicles, these employing 8,310 persons, paid salaries totaling $2,889,320 for the year. The division of tires shows pneumatics to the value of $16,860,396 and solid tires to the value of $4,312,084. Bicycle tires to the value of $10,987,032 were manufactured.

The majority of tires used on German motor vehicles are of German manufacture, although some French makes are becoming popular.

### Briscoe Co. Goes Into C. of C.

NEW YORK CITY, March 28—The Briscoe Co., of which Benjamin Briscoe is president, has been admitted to membership in the National Automobile Chamber of Commerce. The Briscoe car is made at Jackson, Mich.

## American Cars Lead in Sales in New South Wales

SYDNEY, AUSTRALIA, Feb. 20—In the last official report of motor car registrations for New South Wales, the figures show that 79 per cent. of the cars sold have gone into the country districts where farming and pasturage constitute the chief occupations. With this class of population purchasing practically 80 per cent. of the cars, it is not surprising that the low powered and medium powered cars should lead, and that the higher powered cars should reduce in registration instead of even holding their own. The figures show Ford leading with Overland, Buick, Studebaker, Hupmobile and Metz, all American cars, following in numerical order. Some of the small European cars that made considerable headway in New South Wales a year ago are now dropping. The figures show Ford, Buick, Studebaker and Metz to be the biggest gainers in registrations.

The official figures are:

| | | | | | |
|---|---|---|---|---|---|
| Ford | 387 | Bayard | 16 | Star | 2 |
| Overland | 112 | Brasier | 13 | Little Giant | 2 |
| Buick | 78 | Benz | 12 | Soderblom | 2 |
| Studebaker | 66 | B. S. A. | 9 | Berliet | 1 |
| Hupmobile | 51 | G. W. K. | 6 | Belhaven | 1 |
| Metz | 41 | Albion | 13 | Charron | 1 |
| F.I.A.T. | 36 | Lacre | 9 | Chase | 1 |
| Talbot | 36 | I. H. C. | 7 | Cartercar | 1 |
| Renault | 29 | Commer | 6 | Darracq | 1 |
| Star | 28 | Dennis | 6 | Mercedes | 1 |
| Minerva | 20 | F. I. A. T. | 4 | Lansden | 1 |
| Oakland | 20 | Leland | 4 | Karrier | 1 |
| Cadillac | 19 | Durkopp | 3 | Sandford | 1 |
| F. N. | 19 | Halley | 4 | S. P. A. | 1 |
| Little | 16 | Hallford | 3 | Straker Squire | 1 |
| Napier | 16 | Daimler | 2 | Detroit Electric | 1 |

You will see by these figures that American manufacturers are gaining ground alarmingly. In the cities we seem to have nothing else running about but small European cars, but when your gaze is directed to the rural sections the American car is the leader.

The cyclecar is making very little headway in Sydney and vicinity. The G. W. K., an English product, is easily first. Although there is a very small number of them. In Melbourne, where the roads are good, quite a number of cyclecars are running in the streets.

### Eighteen Entries Now for Indianapolis

NEW YORK CITY, March 31—Three Mercers and one Stutz are the latest entries for the Indianapolis race on May 30. Eddie Pullen, it is said, will drive one Mercer and Spencer Wishart another. The third driver is not yet named. The Stutz entry will be piloted by Barney Oldfield, making the third car from the Stutz factory for this race. The other two Stutz drivers are Earl Cooper and Gil Anderson.

Two of the Mercer cars are in the 445-inch class, while the third is in the 300-inch class. Pullen will probably drive the small car and Wishart one of the bigger cars. This makes the list of entries to date amount to eighteen.

### Wire Vs. Wood Wheel Test Starts

NEW YORK CITY, March 31—The test of wire and wood wheels as related to tire wear, conducted by the Pennsylvania Rubber Co., started today at 2 p. m. when the two new Lozier fours left the Automobile Club of America. The cars will run together over the roads around this city until one of the sets of Vacuum Cup tires are destroyed. It is expected that conclusive figures on wire and wood wheel tire wear will result from these tests.

# Knight Patents Double Sleeve

## Takes Out Another American Patent—First, Granted August 23, 1910, Covered Single Sleeve

WASHINGTON, D. C., March 26—Under date of March 24, 1914, Charles Y. Knight has been granted the patent on his sleeve-valve engine for which he applied June 4, 1906. The patent number 1,090,991, is assigned to Knight & Kilbourne Patents Co., Chicago, Ill., a corporation of Delaware. This supplements the single sleeve patent granted August 23, 1910.

The patent, which was in the patent office for eight years before finally being issued, deals with the well-known Knight sleeve-valve engine and also includes a system of lubrication, especially designed to feed oil to the upper part of the engine's sleeves. While the sectional view of the engine and the lubricating system shown would hardly pass a modern application of the Knight sleeve principle, it still shows the sleeve action to be identical with that employed.

The Knight patent has forty-three claims which cover the sleeve-valve action and the lubricating device. The claims cover the two reciprocating sleeves, their method of reciprocating, the ports within the sleeves and the registry of the ports to secure the gas passage at the proper time. Regarding the sealing of the combustion chamber the junk ring construction is patented and the working of the sleeves in the annular space about the top of the cylinder, as shown at B, have been allowed in the patent claims.

Claim 1, the key to the other forty-two which are based on the different details and appliances necessary to the operation of the motor, follows:

> In an apparatus of the character described the combination of an internal combustion engine having ports and embodying a main cylinder or casing, a crankcase on which said cylinder is mounted and into which it opens, two telescoped sleeve valves for controlling the ports of the engine sliding axially within said main cylinder, a working piston reciprocating in the inner one of said sleeve valves, a head fixed to the main cylinder and projecting into the inner sleeve valves whereby a chamber is created at the ends of said sleeve valves removed from the crankcase, the outer one of the sleeve valves being in working relation to the main cylinder, and means operatively connected with the piston for reciprocating said sleeve valves in said chamber, whereby suction and compression are created therein alternately as the piston alternately creates suction and compression in the crankcase, and means for supplying the crankcase with lubricant whereby which lubricant will be caused to contact with the end faces of the sleeve valves and to be distributed between such valves lengthwise thereof.

The head construction is covered in claim 20, which follows in part:

> 20. In an apparatus of the character described, the combination of a main cylinder of an internal combustion engine, having intake and exhaust ports, a head fixed in said cylinder and projecting thereinto and spaced from the walls thereof, two telescoped with said head in said cylinder and in the space between the latter and the head, said sleeve valves having ports adapted to come into register as the valves reciprocate (the inner one of said sleeve valves co-operating with said head for closing the ports in said inner sleeve and the outer one of said sleeve valves co-operating with the inner sleeve for controlling the ports in the said outer sleeve, a working piston reciprocating in the inner one of said sleeve valves with relation thereto and with relation to said head, means for firing a charge in the inner one of said sleeve valves between said piston and head.

The junk ring packing in the cylinder head is specifically mentioned and covered in claim 28, which mentions it in the following words:

> 28. A head in the first said cylinder and with which head the second said cylinder is telescoped and moves with reference thereto, packing rings interposed between said head and second cylinder, means for igniting a charge between the head and the piston, a crank connected with the piston, means operatively related.

An important point in the Knight patent is the claim made by Knight & Kilbourne that the movement of the sliding sleeves is not confined to a reciprocating movement, but may be rotary or any other. This statement is based on the wording of claim 24, which provides for "a sleeve concentric with said cylinder, also connected with the piston and *movable relatively to said cylinder.*"

In the patent description the cylinder contains two sleeves C and F, which reciprocate within it. The piston D travels within the inner sleeve F. Above the cylinder is a gas-tight head B. The two sleeves are operated by the eccentrics E, and they are provided with intake and exhaust ports which provide the gas passages when they register with each other and with the port in the fixed cylinder. The patent drawing shows auxiliary exhaust ports near the base of the sleeves, which are not now used.

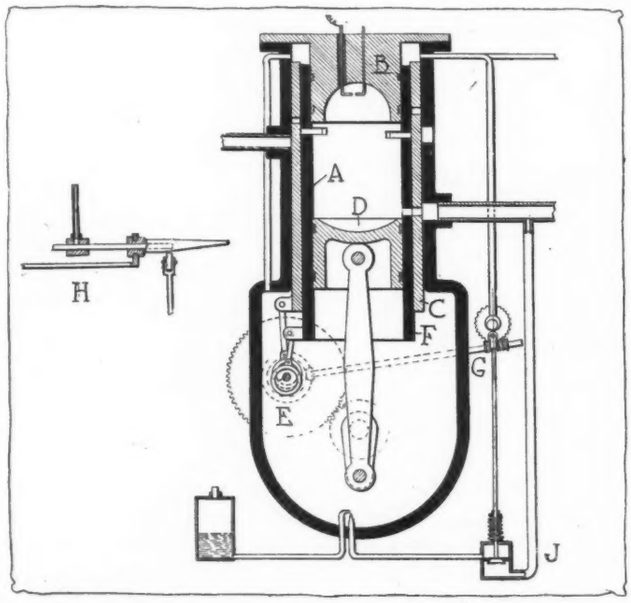
**Lubrication by a Mist of Oil**

Referring to the lubricating device, the base of the engine is in the usual form of an inclosed crankcase, but contains within it the air and oil nozzles which are shown inserted in the bottom of the case. The oil nozzle is shown communicating by means of a tube with the oil reservoir on the left. The air nozzle communicates with the exhaust passage J and thereby secures exhaust pressure. The oil in the crankcase is converted by the pressure into a mist or oil fog, which is forced through the opening shown at the top left of the crankcase into the pipe leading to the upper end of the cylinder above the sleeves. The valve shown at J governs the amount of exhaust pressure admitted to the crankcase by means of the valve stem and cam arrangement shown at G. The assembly of this cam and follower is shown at H. The movement to the camshaft is given by the worm G, which takes its motion from the eccentric shaft E through a bevel gear.

## The Kardo Situation in Analogy

DETROIT, MICH., March 30—Editor THE AUTOMOBILE:—In a recent editorial in THE AUTOMOBILE, March 19, headed "Removing the Lid," you picture the Kardo Co. as "a burning brand thrown into the hoped-for smouldering faggots of patent litigation, which stirred the motor industry in America so persistently until a year ago."

The automobile industry has been particularly free from patent litigation, largely, no doubt, because of its very rapid growth. And at the same time there is probably not another industry in which there has been so much wholesale appropriating of patented features. Because one company has appropriated the good features of another's axle, a third has apparently presumed that it was public property. In like manner, if one man builds a house in a corner of your field, another man may think himself entitled to build in the opposite corner. Perhaps you would not so seriously object to the first man; he may be a good friend of yours, but after about ten strangers have squatted on your land, if you are at all aggressive, you will be inclined to ask them to pay a suitable rental or move. If they did not do what was reasonable, would you rightfully be dubbed a public nuisance




Section through Knight motor on which a patent has just been allowed. This patent was applied for June 4, 1906, and was granted March 24, 1914

if you retained pretty good counsel and instituted suit to recover the rental, even back rental, or enforce a removal? That is the Kardo situation to-day, and it is believed that there is absolutely no flaw in its title to the rentals. If the trespassers wish to stay on the land and become tenants at a fair rental there is no objection on the part of Kardo. If an unreasonable attitude is assumed by them, they can hold themselves and not the Kardo Company responsible for embroiling "the entire industry in a maelstrom of patent litigation."

"Concerted efforts for peace" will be a part of the principles of The Kardo Co., but not at the price of all concessions coming from one side.

MILTON TIBBETTS, Packard Motor Car Co.

### Trenton Brass Co. Sues Stromberg

BUFFALO, N. Y., March 31—A suit was filed today in the United States District Court by the Trenton Brass and Machine Co., Trenton, N. J., manufacturers of the Flechter carbureter, against J. G. Barclay, Inc., the Buffalo distributer of the Stromberg carbureter. The suit is for the alleged infringement of patent No. 1,041,708, granted October 15, 1912, to W. K. Anderson, now owned by the Trenton Brass and Machine Co.

It is claimed by the Flechter interests that the Stromberg Co., after prosecuting two unsuccessful infringement suits against the Flechter carbureter, have now turned around and copied the features of construction of the Flechter carbureter covered by the Anderson patent, and it is stated that the suit is brought in Buffalo because the Federal courts in Chicago and New York City are so crowded that it takes a year or two to bring a case on for trial. The trial in the present case in Buffalo is expected before the summer.

### Renault Direct-Drive Patent Expires

PARIS, March 21.—Louis Renault's direct-drive patents have become public property during the past few days. In 1904, when practically all cars had chain or other indirect drive systems, Louis Renault was granted a patent for the now universally adopted system of direct transmission of power from the motor to rear axle. In 1905 the validity of the patent was upheld by the Paris Supreme Court of Appeal, and since that date practically all French manufacturers have paid royalty to Renault. A few refused to recognize the patent, but a recent decision of the courts is in favor of Renault, and these firms have been ordered to pay on all their past construction.

The direct-drive royalty appears to have been a variable quantity. While many firms paid ½ per cent. of the chassis price, others made an early arrangement whereby a fixed sum was paid annually, whatever the number of cars built. It is estimated that of recent years Louis Renault's revenue from the direct-drive patent has been not less than $200,000 per annum. No attempt has been made to enforce the patent abroad, but all foreign firms selling cars in France have been obliged to pay royalty.

### Auto Parts Co. Invokes Copyright Law

PROVIDENCE, R. I., March 26—T. F. Wilson of Cranston, owner of the Auto Parts Co., 50 Exchange Place, entered suit in the U. S. District Court yesterday against G. H. Flint, owner of the Flint Motor Parts Co., of this city, and has asked that an injunction be granted by Judge A. L. Brown, restraining the further publication and sale of a book which is alleged to be an infringement of the copyright granted to Mr. Wilson for a similar book. Damages also are asked.

### Prest-O-Lite for Freight Raise

INDIANAPOLIS, IND., March 28—The Prest-O-Lite Company of Indianapolis has notified the Interstate Commerce Commission that it favors the proposed 5 per cent. increase in freight rates for the railways. The company is probably the largest manufacturer in Indianapolis and has fifty-two branch stores and plants throughout the United States and is spending approximately $250,000 for freight charges. In explanation for its stand, the company says it believes the time has come for manufacturers and shippers to realize the importance of railways and to quit attacking the railways' source of income and dictating increased forms of railway expense. Some time ago the Indianapolis Chamber of Commerce adopted a resolution opposing the increase.

### $10,000,000 Emergency Road Bill Passed

ALBANY, March 26.—Under emergency messages from Governor Glynn, both the Senate and Assembly to-day passed the Frawley bill, designed to appropriate $10,000,000 for highway improvement and maintenance.

## General Increase in Registration Fees Causes Annoyance

### Registration a Police Power

DES MOINES, IA., March 28.—W. S. Allen, Iowa Secretary of State, recently has made a ruling that the Iowa registration fee for automobiles is a police measure and not taxation. This was made in the case of a Vinton man who bought a second-hand car in 1914, and for which the previous owner had not paid the 1913 fee. Secretary Allen holds that the new owner must pay the 1913 fee, and that it is the duty of a person buying a second-hand car to see that the fee for the previous year has been paid. The question probably will go to the courts, since the Vinton man has placed the question in the hands of his attorney. Secretary Allen says the fee is a police measure rather than taxation, because it is the same for a $600 or a $7,000 car.

### N. Y. City Has 44,628 Cars

NEW YORK CITY, March 28.—Secretary of State May reports that since February 1 more than 70,000 pairs of automobile number plates have been sent out by mail, an increase of about 6,000 over last year's figures in the like period. There are now 44,628 automobiles registered with the New York City bureau, against 41,546 last year. He adds that he expects to save about $25,000 to the state by sending the 1914 registration numbers by parcel post. It costs about 12 cents a set to send them that way, against 35 cents a set by express.

### Wisconsin Clubs To Fight Fee

MILWAUKEE, WIS., March 28.—A concerted movement to test the validity of the Wisconsin law requiring the registration of motor cars and the payment of a $5 fee by private owners at the beginning of each year is proposed by several motor clubs of Wisconsin. The recent successful action against annual registration fees in Ohio has stimulated effort here. Milwaukee motorists claim they are subjected to double taxation, as the state collects a license fee and also a personal property tax on motor cars. As the personal property tax is higher than the annual license fee in a great majority of cases, it is proposed in some quarters to compromise the situation by making the license fee receipt an offset on the personal property tax payment. In the payment of income tax in Wisconsin the personal property tax receipt is an offset. The motor registry fees in Wisconsin are annual in nature and are as follows: Private owners, $5; dealers, $10; motorcycles, $2; transfer of license from one car to another during any one year, 50 cents. The net profits now go into the state highway fund.

### Iowa Fee Fund $500,000

DES MOINES, IA., March 28.—Iowa automobiles have passed the 65,000 mark in the registration at the State House and the State Treasurer now has over half a million dollars on hand in the automobile fund for the year. State officials are swamped with orders for more registration cards and every indication is that all records will be badly broken. Of the money now on hand, the sum of $80,550 will go to the State Highway Commission, while the rest will be distributed among the 99 counties of the state. Delinquent notices will be sent out to auto owners who have not paid their taxes on May 1.

### Wisconsin Issues 25,000 Licenses

MADISON, WIS., March 28.—Wisconsin motor car registrations by private owners passed the 25,000 mark on March 27. At the close of business, the total 1914 registration was 25,401. More than 1,000 licenses have been issued to dealers and 2,875 licenses have already been issued to motorcyclists. The 1913 registration totaled 34,646.

DENVER, COL., March 27.—Secretary of State Pearce estimated today that about 7,000 licenses for 1914 have been taken out in all parts of the state. There were 13,500 in 1913, the first year of the state license law.

# State Law Mills Have Bumper Grist

## Since 1914 Legislatures Opened Over 160 Bills Were Introduced —Very Few Are Reasonable

NEW YORK, March 24.—In the first ten weeks following the opening of the legislatures in January, more than 160 bills relating to or directly affecting motor vehicles and highways were introduced.

Some are good and deserving of enactment, such as bills creating state highway commissions, requiring lights at night on all vehicles, authorizing the placing of warning signs at dangerous turns and hills and so on, according to the National Automobile Chamber of Commerce. Others are decidedly unjust toward the automobile and motor truck owner and a considerable percentage are merely ridiculous.

In this last class is Assembly bill No. 702, introduced in New Jersey, March 5, prohibiting anyone operating a motor vehicle at night unless the headlights are "shaded or hooded so as not to cast the direct rays at a greater elevation than five feet from the ground." As in numerous other bills, the purpose of this measure is apparently to force the sale of a patented device. Another such bill is Assembly No. 292, requiring every automobile to "have attached on the front a practical accident-recording device that will enable at least seventy-two identification markers, in the form of regulation discs, to be scattered upon coming in contact with any object."

The automobile driver's main reliance against accidents at night is on powerful headlights that enable him to see wagons, buggies, pedestrians and other objects a long distance ahead, but Senate Bill 118 in Rhode Island specifically forbids the operation of any vehicle "to which there are lights attached of such candlepower as will throw rays 200 feet ahead."

The obvious purpose of a large proportion of the bills is to produce funds which can be applied to road maintenance and construction. By putting a proportionate tax on horse-drawn vehicles, the yearly vehicle license fund for road work would be doubled. Instead of a fund of between $5,000,000 and $7,000,000 now obtained from the whole country from one class of road user, there would be an annual maintenance fund of $15,000,000 obtained from all users.

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### Michigan Horsepower Tax Killed

DETROIT, March 26.—The Supreme Court of Michigan today declared unconstitutional the State automobile tax law passed by the 1913 Legislature, which provided a tax of 50 cents per horsepower on all motor vehicles, regardless of their age, condition or value. The 1913 registration fee of $3 was superseded by this tax, and the court decision now makes the license fee again $3. It is said that approximately $226,000, which the State has collected from motorists under the new law will have to be returned. This is the difference between the rate of last year and that which the new law provided.

In the City of Detroit alone this will mean that about $10,000,000 will be kept on the assessment rolls since the new law, now declared invalid, exempted motor vehicles from city and county taxes and diverted such tax to good roads work. This means a saving to the city of about $200,000 and to the county of about $50,000.

The court held that the act was unconstitutional in that the "title of the law was not sufficiently broad to cover the body of the bill," and that "it was a license title on a tax law."

The court said, further: "The clear purpose of the Legislature in exacting so large an amount under the guise of regulation makes it a tax measure, which clearly is not covered by the title of the act.

"This graduated fee according to horsepower must be held to be a mere guise or subterfuge to obtain the increased revenue. The real and controlling purpose of the legislation of 1913, in our opinion, appears on its face, and is found in Section 15. In our opinion, the act clearly is a tax measure when stripped of its guise, and as a tax measure the object is not embraced in the title and for that reason alone is unconstitutional."

Under the graduated law of 50 cents per horsepower, the old car paid as much as the new, and the high-price electric vehicle got off with very little taxation. The overthrow of the new law, however, does not benefit the Detroit motorists' pocketbooks at all. They now must pay personal taxes which in most cases will more than equal the difference between the $3 flat rate and the 50 cents-per-horsepower rate, which exempted the machines from further taxation.

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### Sparton Injunction Not Final

NEW YORK CITY, March 28.—In the issue of THE AUTOMOBILE, March 19, 1914, page 662, in the report of the Klaxon vs. Sparton litigation before Judge Hough in the United States District Court, the statement was made that a permanent injunction had been issued against the Garland Auto Co., the Haynes Auto Co., and the Jackson Eastern Distributor, Inc., dealers of the Sparton horns, but that by the payment of $2,000 to the Klaxon interests the Court granted the privilege of the recession of this injunction until June 30. It was in error to state that these companies dealing in the Sparton horn had to make payment of this sum, the decision of Judge Hough stating that the defendants, or Sparton interests were required before March 25, 1914, to give the Klaxon a bond or undertaking to the sum of $2,000, conditioned for the payment of all damages or profits which may be shown to be due Klaxon by reason of manufacture or sale of Sparton horns until June 30, 1914.

By Judge Hough's decree the question between Klaxon and Sparton is left in abeyance until June 30, at which time it is expected that a decision from the Court of Appeals will be handed down in the Klaxon vs. Newtone suit which decision might have a bearing on any decision that Judge Hough would render. The $2,000 bond is merely to cover for damages that might arise during this interim or period of waiting, should the Court of Appeals decide in favor of Klaxon.

Judge Hough's decree states "that complainant (Klaxon) having waived its rights thereto, defendant (Sparton) shall not make an accounting of any gains and profits by it made, nor shall the complainant recover out of said defendant Sparton the damages sustained by the complainant down to March 25, 1914, nor any costs or charges in this suit."

In its decree the Court reserves its right of changing, modifying, reviewing or reversing the decree during the time as extended to June 30.

The decree of Judge Hough follows:

This cause, having come on to be heard; thereupon, upon consideration thereof, it is ORDERED, ADJUDGED and DECREED, as follows:

1. That Lovell-McConnell Manufacturing Company, a corporation of Delaware, the present complainant, is the owner of the entire right, title and interest in the letters patent in suit numbered respectively 923,048, 923,049 and 923,122, all issued on May 25, 1909, upon the applications of Miller Reese Hutchison, and of all rights pertaining to each of said letters patent.

2. That said letters patent No. 923,048, for mechanically actuated acoustic apparatus and method, is good and valid in law as to the claims in issue, namely, 16, 17, 19, 24, 27, 29, 36, and 37, and that the defendant Garland Automobile Co., Haynes Auto Co., and Jackson Eastern Distributing Co., Inc., have infringed said claims.

That said letters patent No. 923,049, for cam operated horn, is good and valid in law as to the claims in issue, namely, 1, 2, 12, 13, 22 and 30, and that the defendant Garland Automobile Company has infringed said claims.

That said letters patent No. 923,122, for mechanically actuated diaphragm horn or alarm, is good and valid in law as to the claims in issue, namely, 1, 2, 3, 45, 47, and 53, and that the defendant Garland Automobile Company has infringed said claims.

3. That by the infringements aforesaid the said defendant has violated the exclusive rights of the complainant in the several enumerated claims of said letters patent.

4. That a writ of injunction, directed to said Garland Automobile Co. be on March 25, 1914 (unless stayed as hereinafter directed) issued out of and under the seal of this court permanently enjoining and restraining defendant and defendant's officers, attorneys, clerks, servants, agents and employees, from directly or indirectly making or causing to be made, using or causing to be used, selling or causing to be sold, any devices or horns containing, embodying or employing the said inventions embraced in or covered by the said claims 16, 17, 19, 24, 27, 29, 36 and 37, of said letters patent No. 923,048, claims 1, 2, 12, 13, 22, and 30 of said letters patent No. 923,049, and claims 1, 2, 3, 45, 47 and 53 of said letters patent No. 923,122, or any of said enumerated claims of said letters patent, or the rights of complainant thereunder.

5. That complainant having waived its right thereto, defendant shall not make an accounting of any gains and profits by it made, nor shall the complainant recover out of the said defendant the damages sustained by the complainant down to March 25, 1914, nor any costs or charges in this suit.

6. That if before March 25, 1914, the defendant herein give to complainant a bond or undertaking, in the sum of $2,000 conditioned for the *payment of all damages or profits which may hereafter be shown to be due complainant by reason of defendant's use, manufacture or sale of any article or device covered by the hereinabove enumerated claims of the patents in suit, from and after March* 25, 1914, then and in such case no injunction shall issue until the further order of this court, or *June* 30, 1914, as the case may be.

7. That the term of this court at which this decree is entered be and the same hereby is extended for all purposes relating to this cause until June 30, 1914, and specially is the power reserved of changing, modifying, reviewing or reversing this decree, during the term as extended, in any way, method or manner for which application may be made and approved.

# Features in High-Speed Motors

## Compromise Between European Extremes Best for America, W. M. Power Tells S. A. E.

NEW YORK CITY, March 27—The regular monthly meeting of the Metropolitan Section of the Society of Automobile Engineers was held last night at the Automobile Club of America. The subject of the evening was "General Trend of American Motor Design," the paper being read by Wm. M. Power.

Before taking up this topic several other matters were discussed, the members going over and slightly revising the rules governing the conditions upon which papers are to be accepted by the Metropolitan Section.

### Plan for Associate Members

There was a brief discussion of a plan suggested by David Beecroft for an associate or student membership in the Metropolitan Section. Mr. Beecroft pointed out that there are thousands of young men in and around New York who are either taking engineering courses or who have just graduated from engineering schools who would gladly affiliate themselves with the Society and do much to put enthusiasm and new ideas into its meetings if they could do so at a nominal fee. He suggested that such a fee should be $3 or $4 a year and should convey the right to attend the meetings. Chairman Anglada referred the matter to a committee who will report at the next meeting.

The next meeting of the Society will be held on April 30 when Finley R. Porter, former engineer of the Mercer Automobile Co., will read a paper on the Influence of Racing on Motor Car Design. This will be illustrated by moving pictures of the Grand Prix and other races.

In his paper on the General Trend of American Motor Design, Mr. Power said in substance:

In America the factor of economy plays a very small part in motor design, the general argument being that this is a matter of minor importance as the price of fuel is not nearly so high in this country as in Europe.

In Europe the designers have gone to extremes to obtain fuel economy combined with high power output, their piston speeds sometimes running over 3,000 feet per minute. This type of construction requires large valves and necessitates more gear changing than with the American type of motor, as the motor cannot be run on open throttle at low speeds. The motor is more expensive to construct, it requires more careful adjustment and overhauling. The light parts required are more expensive than those used in American motors although this is somewhat offset by economy in material. Such a motor is very sensitive and costs little to operate, although the driver must be educated to the more careful handling required.

### A High-Speed Motor

In Mr. Power's opinion a compromise between the European types would probably be best for American conditions. Such a motor Mr. Power outlined as follows: It should have a clear valve opening of 50 per cent. of the cylinder diameter, and possibly a 6 inch stroke. The timing might be as follows: Exhaust opens 45 to 48 degrees before bottom center and closes 10 degrees after top center. Inlet opens 10 degrees after top center and closes 35 degrees after bottom center.

An interesting feature of the motor is the use of light piston rings, three rings being used on each piston and mounted in a single groove. The upper two rings are narrow and under no tension, while the bottom one if broad fits tightly in the cylinder, holding compression. All rings have staggered joints.

The pistons may be machined to fit the cylinders somewhat loosely except for a relief near the head. As the engine operates the heat will distort the pistons to fill the cylinders, increasing the compression. The valves should have narrow seats.

Connecting-rods may be of the tubular, hollow type, or of the deep I-section variety, the latter being preferred. Half-inch bolts should be used.

Lubrication is forced feed throughout with a pressure up to 25 pounds, the crankpins being oiled through drilled webs.

In concluding his paper, Mr. Power remarked that the American people are beginning to realize the need for fuel economy.

### Interesting Discussion

Finley R. Porter, formerly chief engineer of the Mercer Automobile Co., observed that:

"In regard to the timing of high speed motors the exhaust valves on the racing Mercer which Pullen drove in the Grand Prix race were timed to close 65 degrees past bottom dead center. Two years ago the Mercer company tried 45 degrees, then 50, and this year made it 65 degrees. At extreme piston speeds the time of closing could be still more retarded for the exhaust valves."

Mr. Power stated that the torque curve on the motor he mentioned dropped only 11 pounds from 1,100 to 2,200 revolutions per minute. A motor of the size mentioned would be considered excessively large in Europe.

J. A. Anglada, chairman of the Section, asked: "Which construction do you favor for the connecting-rods, the two-bolt or the four-bolt?"

"I have never seen the two-bolt construction give any trouble when properly designed and when light parts are used," answered Mr. Power. "I have known instances where the four-bolt construction gave trouble."

Mr. Porter stated that the Mercer company has used the four-bolt type as they would make the big end of the connecting rod lighter in this way. They found that the two-bolt construction necessitated making the rods ends 40 per cent. heavier.

E. Favary, inventor of the Favary non-pneumatic tire, asked: "Which type of motor do you consider gives the most power, the I-head, T-head or L-head? I have seen motors tested which showed that with the same valve openings 2 per cent. more speed was obtained with the valve-in-the-head type than where the valves were at the sides."

Mr. Power answered:

"I think the valve-in-the-head is more efficient owing to the more spherical shape of the combustion space, the more direct fuel feed, etc."

Herbert Chase, of the A. C. A., remarked: "With a 5 degree overlap of the valves a double manifold would be required on a six-cylinder motor of the type mentioned, though this would not be necessary on the four."

J. A. Anglada asked if the force feed lubrication up to 25 pounds had proved satisfactory.

Mr. Porter observed:

"In the motor on Pullen's car in the Grand Prix race the feed was by pressure to the main bearings only, but this pressure went up to 150 pounds and sometimes to 400 pounds. Big pumps were used. We also used aluminum scoops on the crankshaft and had no trouble."

J. A. Anglada: "Was the feed to the crankpins by pressure?"

Mr. Porter: "No, we left the lubrication of the crankpins to the centrifugal force and to the oil mist in the crank chamber."

Mr. Anglada: "In your motor, Mr. Power, was lubrication of the crankpins and wristpins by force feed?"

Mr. Power: "By splash only to the cylinders and wristpins."

Mr. Chase: "In the Moline-Knight motor recently tested at the A. C. A., hollow connecting-rods were used for lubrication purposes. These were found to fill up with oil, making them very heavy. In the test a 1-8 inch hole was bored 3 inches above the center of the big end. After this lubrication was all right, the oil flowing through the hollow rod, then through the wristpin to the cylinder walls and valve surfaces."

Mr. Anglada: "What pressure was used?"

Mr. Chase: "No definite pressure; the motor was designed for 40 pounds pressure, according to Mr. Vandervoort, its designer, but this was cut to 4 or 5 pounds in the test."

## Vacuum Oil Capital May Increase

NEW YORK CITY, March 31—The Vacuum Oil Co. has had since last January a plan wherein it will increase its capital from $15,000,000 to $25,000,000 during the current year. It is stated that this sale of stock to shareholders at par would greatly help the concern in the expansion of its business, while at the same time the company's capital would be brought up to a figure more nearly representing its net assets.

It is not expected that any increases in the present dividend rate of $6 per annum will be made for a long time, despite the fact that the company's report for 1913 will probably show net earnings equivalent to more than 30 per cent. on the $15,000,000 stock.

Since the dissolution of Standard Oil, the Vacuum company has built a refinery at Bayonne, N. J., and has spent large amounts in extending its refining and marketing facilities in Russia, Austria-Hungary, Germany and Australia. The greater part of last year's surplus earnings were turned back into the property. Before the dissolution, the Vacuum company was able to use the facilities of other Standard Oil companies to a large extent in the conduct of its business, while since the beginning of 1912, the company has had to spend large sums in building up its own distributing system. This partly explains the present need of additional funds.

# Average Price of U. S. Cars Exported $900

## Automobiles Imported Into This Country Average $3,400

WASHINGTON, D. C., March 27—The average valuation per car of the automobiles imported is considerably higher than that of the automobiles exported. Those imported during January were valued at about $3,400 each, and those exported at about $900 each. This average import price of $3,400 is exclusive of transportation charges to our shores and duties collected, the ad valorem rate of duty assessed on cars valued at less than $2,000 each being 30 per cent., and on all other cars 45 per cent.

The increasing importance of the automobile as a factor in international trade is apparent from the fact that the exports of automobiles from six leading manufacturing countries now aggregate 119 million dollars in value, an increase of 10 million over those of 1912 and 70 million over those of 1908. In this growing trade the United States occupies a prominent place and it is believed sales in numerous parts of the world have resulted directly from the trade-promotion service maintained by the bureau of foreign and domestic commerce which is constantly bringing to the notice of American manufacturers foreign trade opportunities with respect to automobiles and other lines of goods.

While France still leads the world in exportation of automobiles, the United States has made the most rapid gain. Exact comparisons are not practicable owing to differences of classification established by the various countries. So far as ascertainable from the official accounts of the countries named, exports of automobiles including chassis, but omitting tires, increased in the case of France, from 25 million dollars in 1908 to 44 million in 1913; Germany, from 3 to 20 million; the United Kingdom, from 8 to 14 million; Italy, from 5 1-2 to 6 1-3 million; and the United States, including shipments to Hawaii and Porto Rico, from 5 million to 35 million dollars.

Last year's imports of automobiles into the United States were valued at slightly more than $1,000,000, compared with similar imports of $2,500,000 by Italy, $3,000,000 by Belgium, $3,300,000 by Germany, $3,500,000 by France and $18,000,000 by the United Kingdom.

## Market Report of the Week

THE usual changes occurred in this week's market reports. Tin, though 60 cents lower than on Wednesday, was a little stronger in tone on Tuesday, with higher prices asked for all positions in sympathy with the recovery abroad. There was, however, only a moderate volume of business. The closing price was $37.95. There was small demand from domestic consumers for copper. There is evidence, however, that some of the selling interests are more anxious to sell copper. Lead has suddenly dropped $.20, closing at $3.80 per 100 pounds. It remains dull but steady at the decline. Up-river Para closed this week at a decline of $.01. The trading locally lacked snap, but the market retained a steady tone.

| Material | Wed. | Thurs. | Fri. | Sat. | Mon. | Tues. | Week's Changes |
|---|---|---|---|---|---|---|---|
| Antimony | .05¾ | .05¾ | .05¾ | .05¾ | .05¾ | .05¾ | ..... |
| Beams & Channels, 100 lbs. | 1.36 | 1.31 | 1.36 | 1.31 | 1.31 | 1.31 | ..... |
| Bessemer Steel, ton | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | ..... |
| Copper, Elec., lb. | .14 3/10 | .14⅜ | .14 3/10 | .14 1/10 | .14 9/20 | .14 11/20 | + .00¼ |
| Lake, lb. | .14½ | .14⅜ | .14½ | .14½ | .14⅜ | .14⅜ | — .00 1/10 |
| Cottonseed Oil, bbl. | 7.55 | 7.52 | 7.49 | 7.48 | 7.51 | 7.54 | — .01 |
| Cyanide Potash, lb. | .17 | .17 | .17 | .17 | .17 | .17 | ..... |
| Fish Oil, Menhaden, Brown. | .40 | .40 | .40 | .40 | .40 | .40 | ..... |
| Gasoline, Auto, bbl. | .16 | .16 | .16 | .16 | .16 | .16 | ..... |
| Lard Oil, prime | .93 | .93 | .93 | .93 | .93 | .93 | ..... |
| Lead, 100 lbs. | 4.00 | 3.90 | 4.00 | 3.90 | 3.80 | 3.80 | — .20 |
| Linseed Oil | .54 | .54 | .54 | .54 | .54 | .54 | ..... |
| Open-Hearth Steel, ton | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | ..... |
| Petroleum, bbl., Kans., crude | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | ..... |
| Petroleum, bbl., Pa., crude | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | 2.50 | ..... |
| Rapeseed Oil, refined | .59 | .59 | .59 | .59 | .59 | .59 | ..... |
| Rubber, Fine Up-River, Para. | .75 | .75 | .75 | .74 | .74 | .74 | — .01 |
| Silk, raw Ital. | .... | 5.10 | .... | .... | 5.10 | 5.15 | + .05 |
| Silk, raw Japan | .... | 4.25 | .... | .... | 4.25 | 4.28 | + .03 |
| Sulphuric Acid, 60 Baume | .90 | .90 | .90 | .90 | .90 | .90 | ..... |
| Tin, 100 lb. | 38.55 | 38.30 | 37.75 | 38.13 | 37.87 | 37.95 | — .60 |
| Tire Scrap | .04½ | .04½ | .04½ | .04½ | .04½ | .04½ | ..... |

## Kelly-Springfield Profits Near $600,000

NEW YORK CITY, March 30—The Kelly-Springfield Tire Co. has issued a statement for the year ended December 31, 1913, as follows:

| | |
|---|---|
| Gross profit | $1,264,567 |
| Operating and administrative expense | 716,189 |
| Net operating income | 548,378 |
| Other income | 43,376 |
| Total income | $591,754 |
| Interest | 32,210 |
| *Total net profit | $559,544 |

*This does not include profit on goods sold and not delivered.

The consolidated balance sheet of the company, as of December 31, 1913, shows assets as follows: Cash, $145,733; notes and accounts receivable, $535,121; prepaid charges $33,979; inventories, $1,231,608; plant accounts and patents, trade marks, good will, etc., $7,888,618; total, $9,835,060.

The liabilities are as follows: Accounts payable $17,938; reserve accounts, $352,784; accrued charges, $14,037; stock of statistics. The table is for a period of 13 months, from notes and accounts receivable, $535,121; prepaid charges, preferred stock, $1,149,500; common stock, $4,000,000; profit and loss surplus, $1,449,799; total, $9,835,060.

## Indian Refinery Earns $1,726,066.41

NEW YORK CITY, March 31—According to the annual report of the Indian Refining and subsidiary companies, net earnings for 1913 are $1,726,066.41.

Fixed assets of $5,812,970.16 are appraised, and $2,517,177.34 is the aggregate of current assets, including $675,331.55 cash, $976,860.31 accounts receivable, and $830,368.64 stock on hand.

Of its authorized capital stock the company has issued $3,000,000 in cumulative 7 per cent preferred and $3,000,000 of common. The total capitalization of $7,500,000 includes $1,500,000 common not issued.

During the year the company retired $1,487,318.52 in capital liabilities. Bank loans amounting to $2,314,000 were paid. New liabilities, including $61,000 in first mortgage bonds and $2,549,600 were issued, however. In addition to this reduction in capital liabilities and bank loans of $1,190,718.52, there is a gain in excess of current assets over current liabilities of a net amount of $446,674.29.

In the assets is a general reserve of $610,465.47 set aside against the exhaustion of oil deposits and other contingencies.

## Bonnell to New Underwriters Association

NEW YORK CITY, March 28—H. A. Bonnell, Assistant General Manager of the National Automobile Chamber of Commerce, Inc., has resigned to accept the secretaryship of the Manufacturers' & Dealers' Motor Underwriters, 80 Maiden Lane, New York City, an organization recently formed by a number of large motor car manufacturers and others prominent in the automobile industry to handle all kinds of motor car insurance. Mr. Bonnell takes up his new secretaryship work immediately.

The Manufacturers' & Dealers' Motor Underwriters has in view establishing arrangements with all motor car dealers throughout the country whereby these dealers can write insurance policies on the cars sold by them. The plan will be to approve of dealers in different cities who shall be deemed eligible to handle such work and the dealer will receive a

satisfactory commission for his insurance services. It is understood that the Manufacturers' & Dealers' Motor Underwriters will not carry the insurance themselves, but will place it with standard insurance companies now in existence. Mr. Bonnell has been actively identified with the motor industry for a number of years. He was manager of the Automobile Board of Trade until it was merged into the present National Automobile Chamber of Commerce. He has been treasurer of the American Automobile Assn. for a number of years and has been manager of the show.

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## Standard Roller Bearing Creditors Meet

PHILADELPHIA, March 27.—There was a meeting of the creditors of the Standard Roller Bearing Co. today for the purpose of receiving a report from R. S. Woodward, Jr., and S. Lawrence Bodine, the receivers, at which it was proposed that a creditors' supervising committee of five be appointed with power to liquidate the concern at any time should such course seem desirable. The general sentiment was to give the receivers a year to put the company on its feet, and if not, liquidate. The receivers' report showed that the assets of the company have shrunk from $6,101,107, as shown in the report of September 13, 1913, to $1,831,432, this representing a shrinkage of $4,269,675. This shrinkage is accounted for by marking off $1,422,000 for patents and $1,452,000 as reduction in the book value of machinery and tools.

According to the receivers' report given today the quick assets of the company are $792,000. The company owes approximately $1,500,000, divided one-third to bondholders, one-third to banks, and one-third to general creditors.

According to the receivers' report the earnings for the last three months were $25,000.

As an outcome of the present controversy between the Standard Roller Bearing Co. and George W. Houk, of the Houk Mfg. Co., Buffalo, N. Y., George W. Houk obtained a capias in the Common Pleas Court today for the arrest of Messrs. Woodward and Bodine in separate suits to recover $100,000 damage from each for alleged slander, in which Houk charges them with declaring in the presence of other persons that Houk was dishonest in his dealings with the Standard Roller Bearing Co.

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WASHINGTON, D. C., March 28.—It is an interesting fact that dutiable imported motor cars remaining in bonded warehouse numbered 92, valued at $200,408, in January last, while in January a year ago the number was only 63, and the value $115,955. These figures lead to the belief that foreign cars are not selling well in New York.

## Automobile Securities Quotations

AT the end of 1913 there were nine automobile securities selling at par or over. Since the beginning of 1914 there has been a steady tendency to rise, especially on the part of the tire stocks. Features beside the tire gains, were the rise of General Motors and Vacuum Oil. Willys-Overland and Stewart-Warner were also among the stocks which showed gains. Packard common and Kelly-Springfield tire are additions to the stocks listed since January 1. Palmer-Singer has gone out. Kelly-Springfield is 53 points higher than on its debut January 29. There are a number of back dividends to be paid on the preferred which gives added strength to the demand. Miller rubber is 20 points higher than at the beginning of the year, while Stewart-Warner shows a gain of 11 points.

During the past week Goodyear common, which has been experiencing a gradual decline during the past quarter, closed this week 5 points lower than on Wednesday, due to the ex-dividend. Good sales has brought the Studebaker common up 4¼ points, the bid being 33. Oils were lower for the past week, Vacuum Oil stock listing at 246, a drop of 5. This is probably partly due to the rumored capital increase, an account of which appears on another page in this issue. The other variations listed under Week's Changes are due to ordinary fluctuations or manipulations of the market.

| Security. | Wednesday Bid | Wednesday Asked | Thursday Bid | Thursday Asked | Friday Bid | Friday Asked | Saturday Bid | Saturday Asked | Monday Bid | Monday Asked | Tuesday Bid | Tuesday Asked | Week's Change | 1913 Bid | 1913 Asked |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ajax-Grieb Rubber Co., common | 200 | .. | 200 | .. | 200 | .. | 200 | .. | 200 | .. | 200 | .. | .. | 150 | 165 |
| Ajax-Grieb Rubber Co., preferred | 98 | 102 | 98 | 102 | 98 | 102 | 98 | 102 | 98 | 102 | 99 | 102 | +1 | 95 | 100 |
| Aluminum Castings, preferred | 98 | 100 | 98 | 100 | 98 | 100 | 98 | 100 | 98 | 100 | 98 | 100 | ... | 95 | 100 |
| Chalmers Motor Co., common | .. | 83 | .. | 83 | .. | 83 | .. | 83 | .. | 83 | .. | 83 | ... | 120 | 125 |
| Chalmers Motor Co., preferred | .. | 94 | .. | 94 | .. | 94 | .. | 94 | .. | 94 | 90 | 94 | ... | 100 | 102½ |
| Firestone Tire & Rubber Co., common | 285 | 292 | 285 | 292 | 85 | 292 | 285 | 292 | 285 | 292 | 280 | 285 | —5 | 285 | 295 |
| Firestone Tire & Rubber Co., preferred | 108 | 109 | 108 | 109 | 108 | 109 | 108 | 109 | 108 | 109 | 107 | 108 | —1 | 103 | 106 |
| Garford Co., preferred | 80 | 90 | 80 | 90 | 50 | 90 | 50 | 90 | 50 | 90 | 80 | 90 | ... | 90 | 100 |
| General Motors Co., common | 75⅛ | 75¾ | 75⅛ | 75¾ | 75⅛ | 75¾ | 75 | 77 | 75 | 77 | 76 | 78 | +⅞ | 29⅛ | 30½ |
| General Motors Co., preferred | 92½ | 93 | 92½ | 93 | 92½ | 93 | 92½ | 93 | 92½ | 93 | 93 | 94 | +½ | 76 | 77½ |
| B. F. Goodrich Co., common | 23 | 23¾ | 23 | 23¾ | 21 | 22 | 21 | 22 | 21 | 22 | 22½ | 23½ | +½ | 32½ | 33 |
| B. F. Goodrich Co., preferred | 86 | 88¼ | 86 | 88¼ | 86 | 88¼ | 86 | 88¼ | 86 | 88¼ | 86 | 88 | ... | 94 | 95½ |
| Goodyear Tire & Rubber Co., common | 175 | 180 | 175 | 180 | 175 | 180 | 175 | 180 | 170 | 175 | 170 | 175 | —5 | 335 | 345 |
| Goodyear Tire & Rubber Co., preferred | 94 | 95 | 94 | 95 | 94 | 95 | 94 | 95 | 94 | 95 | 94 | 95 | ... | 100 | 102 |
| Gray & Davis Co., preferred | 90 | 97 | 90 | 97 | 90 | 97 | 90 | 97 | 90 | 97 | 90 | 97 | ... | .. | .. |
| *Hayes Manufacturing Co. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 90 |
| International Motor Co., common | .. | 5 | .. | 5 | .. | 5 | .. | 5 | .. | 5 | .. | 5 | ... | 5 | 10 |
| International Motor Co., preferred | .. | 15 | .. | 15 | .. | 15 | .. | 15 | .. | 15 | .. | 15 | ... | 35 | 45 |
| Kelly-Springfield Fire Co., common | 58 | 60 | 58 | 60 | 58 | 60 | 58 | 60 | 58 | 60 | 58½ | 60 | +½ | 15 | 20 |
| Kelly-Springfield Tire Co., preferred | 143 | 145 | 143 | 145 | 143 | 145 | 143 | 145 | 143 | 145 | 145 | 150 | +2 | .. | 79 |
| Kelly-Springfield Motor Truck Co., com | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ... | .. | .. |
| Kelly-Springfield Motor Truck Co., prd | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ... | .. | .. |
| Lozier Motor Co., common | 13½ | 16½ | 13½ | 16½ | 13½ | 16½ | 13½ | 16½ | 13½ | 16½ | 14½ | .. | —1 | .. | .. |
| Lozier Motor Co., preferred | .. | 65 | .. | 65 | .. | 65 | .. | 65 | .. | 65 | .. | 65 | ... | .. | .. |
| Maxwell Motor Co., common | 8 | 8¾ | 8 | 8¾ | 8 | 8¼ | 6¾ | 7½ | 6¾ | 7½ | 6½ | 7 | —1½ | .. | .. |
| Maxwell Motor Co., first preferred | 32½ | 34 | 32½ | 34 | 32½ | 34 | 32½ | 34½ | 32½ | 34 | 32½ | 33½ | ... | .. | .. |
| Maxwell Motor Co., second preferred | 12 | 12½ | 12 | 12½ | 12 | 12½ | 12 | 12½ | 12 | 12½ | 11½ | 12 | —1 | .. | .. |
| Miller Rubber Co. | 135 | 141 | 135 | 141 | 135 | 141 | 135 | 141 | 135 | 141 | 132 | 140 | —3 | 178 | 182 |
| New Departure Mfg. Co., common | 120 | 125 | 120 | 125 | 120 | 125 | 120 | 125 | 120 | 125 | 121 | 122 | +1 | .. | .. |
| New Departure Mfg. Co., preferred | 106 | 108 | 106 | 108 | 106 | 108 | 106 | 108 | 106 | 108 | 106 | 107 | ... | .. | .. |
| Packard Motor Co., common | 101 | 116 | 191 | 116 | 101 | 116 | 101 | 116 | 101 | 116 | 102 | 116 | +1 | .. | .. |
| Packard Motor Co., preferred | 95 | 98 | 95 | 98 | 95 | 98 | 95 | 98 | 95 | 98 | 94 | 98 | +1 | .. | .. |
| Peerless Motor Co., common | 20 | 30 | 20 | 30 | 20 | 30 | 20 | 30 | 20 | 30 | 20 | 30 | ... | .. | .. |
| Peerless Motor Co., preferred | .. | 80 | .. | 80 | .. | 80 | .. | 80 | .. | 80 | .. | 80 | ... | .. | .. |
| Pope Mfg. Co., common | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | ... | 18 | 22 |
| Pope Mfg. Co., preferred | 12 | 16 | 12 | 16 | 12 | 16 | 12 | 16 | 12 | 16 | 12 | 16 | ... | 55 | 60 |
| Portage Rubber Co., common | .. | 30 | .. | 30 | .. | 30 | .. | 30 | .. | 30 | .. | 30 | ... | .. | .. |
| Portage Rubber Co., preferred | .. | 85 | .. | 85 | .. | 85 | .. | 85 | .. | 85 | .. | 85 | ... | .. | .. |
| †Reo Motor Truck Co. | 7 | 8¼ | 7 | 8¼ | 7 | 8¼ | 7 | 8 | 7 | 8 | 7 | 8¼ | ... | 11½ | 12½ |
| †Reo Motor Car Co. | 18¾ | 19¼ | 18¾ | 19¼ | 18¾ | 19¼ | 18¾ | 19¼ | 18¾ | 19¼ | 19 | 20 | +¼ | 20½ | 21½ |
| Rubber Goods Mfg. Co., preferred | 105 | 110 | 105 | 110 | 105 | 110 | 105 | 110 | 105 | 110 | 100 | 110 | —5 | 100 | 105 |
| Russell Motor Co., common | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ... | .. | .. |
| Russell Motor Co., preferred | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | ... | .. | .. |
| Splitdorf Electric Co., preferred | 40 | 50 | 40 | 50 | 40 | 50 | 40 | 50 | 40 | 50 | 40 | 50 | ... | .. | .. |
| Stewart Warner Speedometer Co., com | 58½ | 60½ | 58½ | 60½ | 58½ | 60½ | 58½ | 60½ | 58½ | 60½ | 61½ | 62¼ | +3 | .. | .. |
| Stewart Warner Speedometer Co., prd | 99 | 102 | 99 | 102 | 99 | 102 | 99 | 102 | 99 | 102 | 99½ | 102 | +½ | .. | .. |
| Studebaker Co., common | 28¾ | 29¼ | 28¾ | 29¼ | 28¾ | 29¼ | 28¾ | 29¼ | 28¾ | 29¼ | 33 | 34 | +4¼ | 29⅛ | 30 |
| Studebaker Co., preferred | 83 | 85 | 83 | 85 | 83 | 85 | 83 | 85 | 83 | 85 | 86 | 87 | —3 | 90 | 93 |
| Swinehart Tire & Rubber Co. | 60 | 67 | 60 | 67 | 60 | 67 | 60 | 67 | 60 | 67 | 60 | 67 | ... | 90 | 100 |
| U. S. Rubber Co., common | 61½ | 62 | 61½ | 62 | 61½ | 62 | 61 | 62 | 61 | 62 | 61 | 62 | +1 | 63½ | 63¾ |
| U. S. Rubber Co., first preferred | 104 | 104¼ | 104 | 104½ | 104 | 104¼ | 104 | 104¼ | 104 | 104¾ | 103 | 104 | —1 | 106¼ | 107 |
| ‡Vacuum Oil Co. | 251 | 254 | 251 | 254 | 251 | 254 | 251 | 254 | 251 | 254 | 246 | 250 | —5 | .. | .. |
| White Co., preferred | 107 | 110 | 107 | 110 | 107 | 110 | 107 | 114 | 107 | 114 | 107 | 110 | ... | 100 | 108 |
| Willys-Overland Co., common | 63 | 66 | 63 | 66 | 63 | 66 | 63 | 66 | 63 | 66 | 63 | 66 | ... | 57 | 64 |
| Willys-Overland Co., preferred | 89 | 94 | 89 | 94 | 89 | 94 | 89 | 94 | 89 | 94 | 89 | 94 | ... | 90 | 98 |

*No market.
†The par value of these stocks is $10; all others $100. ‡Ex. Div.

# $110,000 Bid for American Motors Plant

## Must Be Approved by Court—Offer Made by S. L. Winternitz—Plans to Resell Piecemeal

INDIANAPOLIS, IND., March 30—Samuel L. Winternitz & Co., of Chicago, auctioneers, were the highest bidders today at the sale of the plant of the American Motors Company. Their bid was $110,000, but the sale is subject to the approval of Judge Albert B. Anderson, of the United States court in which the American receivership and bankruptcy proceedings are pending.

Samuel Winternitz announced that it is the intention of his company to resell the property at public sale piecemeal, which means that the American underslung automobile will pass out of existence. The sale was conducted by A. Greenwald, auctioneer, for Frank E. Smith, receiver. The plant had been appraised at $94,000, and the terms of the sale were $20,000 deposited at the time of the sale and the remainder to be paid in 10 days.

There were about twenty bidders, and the bidding was spirited until toward the last, when it narrowed down to the successful bidder and Mr. Finnegan, of Buffalo, N. Y., who bought the property of the E. R. Thomas Motor Car Co. some time ago.

The first bid was $50,000, made by Finnegan. J. I. Handley, president of the American Motors Co., bid until the $80,000 point was reached. Other bidders were Jack Strauss, New York; John Nuttall, Philadelphia, Pa.; Mr. Levine, Philadelphia, Pa.; G. V. Nelson, of the Auto Parts Co., Chicago; George Sachseumaree, Philadelphia, Pa., and several others.

Samuel L. Winternitz & Co. have bought several motor car plants during the last few months, among the number being that of the Michigan Buggy Co., Kalamazoo, Mich.; the Falcar plant, the Midland plant, the Grabowsky truck plant, and others. There was no real estate involved in the American sale.

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### Purchases Model Gas Engine Works

PERU, IND., March 26—The Pittsburgh Model Engine Co., with a capital stock of $750,000, has purchased the property of the Model Gas Engine Works and is proceeding to erect a new factory in Pittsburgh. The Peru plant will hereafter be operated as a branch of the Pittsburgh plant. The officers of the new company are as follows: President, W. J. Strassburger; vice-president, E. A. Myers; treasurer, J. F. Keenan, and secretary, J. W. Littlejohn. The Pittsburgh plant will be ready to operate about July.

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### Atlantic Vehicle Plant to Be Sold

NEWARK, N. J., March 26—G. W. C. McCarter has been appointed trustee in bankruptcy of the Atlantic Vehicle Co., this city. The entire equipment of the factory and plant of the bankrupt company, situated at 357 Oraton street, will be sold. The bids will be opened at the office of E. G. Adams, Esq., referee in bankruptcy, Essex Building, on April 15, at 10:30 in the forenoon.

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### Kline Buys Kirkham Engine Plant

RICHMOND, VA., March 28—Announcement was made today that through a deal closed by the Kline Motor Car Corp., that firm will manufacture the whole of its product at the local plant in Richmond. W. S. Roberts, secretary of the corporation, received a telegram from James A. Kline, general manager, who announced that he had bought the plant of the Kirkham Motor Mfg. Co., Bath, N. Y., at a receiver's sale. Included in the purchase was a large amount of rough and finished material. All will be shipped to Richmond at once in order that there will be no delay in building the motors for the cars now under construction.

The new arrangement means that the Kline Motor Car Corp. will more than double the number of its employes, all of whom will be skilled mechanics, drawing high wages. The Kline Corp. has a handsome, modern plant here, with a present output of approximately 1,000 cars a year. The buildings are 600 feet in length and are constructed so there are two wings sixty feet wide with railroad tracks in the centre for the loading and unloading of the material and the finished product.

By manufacturing its own motors the company will not be dependent upon outside sources and engine parts can be supplied patrons without delay and at great saving in transportation. It is estimated that motors ready to install cost the company approximately $500 on an average and on a basis of 1,000 cars a year, $500,000 has been expended on the engines alone. As a large part of the amount for motors goes to the workmen this sum will now be spent with the Richmond mechanics who will be given steady employment by the Kline factory.

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### Herreshoff Plant May Resume

DETROIT, MICH., March 27—At the first meeting of the creditors of the Herreshoff Motor Co. today, referee in bankruptcy Lee Joslyn appointed the Detroit Trust Co., trustee. According to its schedule, the defunct automobile concern has total liabilities amounting to $142,819 and assets scheduled of $321,821. Of the total liabilities, $85,620 is secured and $52,862 is not secured. The custodian has appraised the machinery tools and equipment at $4,263 and the merchandise on hand at $31,358.

The appraisal to determine the value of the assets has not yet been made, but the trustee is taking figures to ascertain whether or not the plant should continue to be operated. It has been inoperative for some time.

The next meeting of the creditors is scheduled for April 10.

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### Olds Again Builds Fours

DETROIT, MICH., March 30—The Olds Motor Works, Lansing, Mich. announces that it will soon be in the market with a four-cylinder model to be a running mate of the present six. In making this move the Olds concern returns to its first type of vehicle, and gets the benefit of the good will which this car created.

The new Oldsmobile will be about the same in general appearance as the present six but its wheelbase will be shorter—110 inches. It is to sell for $1,350 fully equipped. The motor is a 30 horsepower type with removable cylinder head and cylinder dimensions of 3 1-2 by 5 inches. The weight will be somewhat under 2,600 pounds, which is the lightest Olds since the days of the curved dash runabout. The car is to have Delco starting and lighting, and other up to the minute refinements.

It is expected according to sales manager J. V. Hall, to market about 5,000 of these fours for the next season. First deliveries will begin May first and production should be in full swing by August 1.

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### $250 Small Car for Canada

FORT ERIE, ONTARIO, CAN., March 31—A new automobile company, to be known as the Johnson Motor Company, is to be incorporated here shortly with capital stock of $1,000,000. It will be a closed corporation and no stock will be offered for sale. The factory is to be constructed on the west side of the Grand Trunk tracks. The total cost of the plant is $200,000 and the buildings will be in three wings. The factory will employ about 1,500 skilled workmen. The automobile to be manufactured in the new plant here will be made to retail at $250 and will weigh only 375 pounds. It will carry two people. All of the parts of the machine will be manufactured in the local factory with the exception of the tires. The car will be known as the "Herman Johnson."

Mr. D. J. Johnson, founder of the new concern and who will be its president, stated that the construction of the plant will probably commence about May 1 and that it will require only about 4 months in which to get it into operation. The buildings are to be of steel frames and hollow tile with sawtooth roofs.

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### Fedders Brings Out Ford Radiator

BUFFALO, N. Y., March 30—The Fedders Mfg. Co., Buffalo, N. Y., has just brought out a radiator especially designed for Ford cars. It resembles the other well-known Fedders radiators in its construction and it is designed for high efficiency. In addition, the core is made much deeper than is actually necessary so that the motor will cool properly even under extraordinary conditions.

The new radiator can be changed with a minimum of trouble, it only being necessary to unbolt the old radiator and attach the new. The retail price of the Fedders-Ford is $35.

# Boston-Chicago Non-Stop Run Proposed for July

## Revival of Plans for Day-and-Night Inter-City Reliability Approved by A. A. A. Head

CHICAGO, March 28—The Chicago Automobile Club aspires to promote this year the Chicago-Boston day-and-night non-motor stop reliability run, which it scheduled for last summer, but which was postponed because of inability to secure a stock car class. It also aspires to have the Glidden trophy for the main prize. The visit to Chicago this week of President John A. Wilson, of the American Automobile Association, was responsible for the revival of the proposition.

**Wilson Cup Offered**

President Wilson promised to do all he could to bring about a stock car class, and went even further in his effort to be of assistance to the Chicago club by tendering to President Vissering the Wilson cup for the touring car that can show an average speed of a mile a minute over a measured mile course. This is the same cup he hung up at Indianapolis four years ago, and which never was won.

The club's contest committee has decided to tentatively schedule the Chicago-Boston run for July, but no attempt was made to get down to details until it is known whether or not a stock car rule can be had. The Wilson cup trials will be run off in September. The conditions call for each touring car carrying four persons of an average weight of 160 pounds and to be fully equipped. There must be two trials, one each way of the course, and the average time will be taken. It is likely that these tests will be made over one of the legs of the old Crown Point road race course.

## C. A. C. To Manage Elgin Races

CHICAGO, ILL., March 30.—The Chicago Automobile Club and the Elgin Automobile Road Race Assn. have signed an agreement whereby the former again will promote the annual Elgin road races. The dates have been changed from those tentatively assigned by the contest board of the American Automobile Assn. Instead of being August 28-29, they will be August 21-22, the change being made to avoid a conflict with the Pomona speedway race, which has been assigned September 9, and which will offer a $25,000 purse.

A change in the Elgin card also has been made. The small-car race idea has been abandoned and the Chicago Automobile Club trophy race will be for cars 450 inches and under, instead of 300 and under. The Elgin National trophy race will be a free-for-all- instead of 450 and under.

## A. C. A. Supports New York Measure

NEW YORK CITY, March 30.—The Herrick bill introduced by Senator Herrick on March 4 has gained another supporter. The Automobile Club of America states that it will support this bill now pending at Albany, provided the bill is altered in three particulars. These are, first, that registration fees be allowed to remain as provided for in the Callan law and not be based on weight, as in the Herrick bill; second, that the speed provision be changed to permit a speed of 20 miles an hour in built-up sections, and, third, that it may be made permissible rather than mandatory for the secretary of state and the courts to consider previous convictions in their home states of non-resident motorists breaking the New York law.

## Revoking Licenses a Check on Drivers

(*Continued from page* 723.)

ing, it determines that the accident occurred without serious fault upon the part of said operator or chauffeur.

**New Hampshire—Secretary Uses Judgment**

The secretary may order any license issued to any person under the provisions of this act to be suspended or revoked, after due hearing, for any cause which he may deem sufficient, and the said secretary may order the suspension of the license of any operator or chauffeur in his discretion, and without a hearing, and may order the license to be delivered to his office, whenever he has reason to believe that the holder thereof is physically or mentally an improper or incompetent person to operate motor vehicles, or is operating improperly or so as to endanger the public, or has made a material false statement in his application, and the license shall not be reissued unless, upon examination or investigation, or after a hearing, the secretary determines that the operator should again be permitted to operate.

**New York—Has Trial Court**

A conviction of a violation of this subdivision shall be reported forthwith by the trial court or the clerk thereof to the Secretary of State, who shall upon recommendation of the trial court suspend the license of the person so convicted, or if he be an owner the certificate of registration of his motor vehicle, and if no appeal therefrom be taken, or if an appeal duly taken be dismissed, or the judgment affirmed, and upon notice thereof by said clerk, the Secretary of State shall revoke such license, or in the case of an owner, the certificate of registration delivered to the Secretary of State, and shall not re-issue to him said license or certificate of registration or any other license or certificate of registration unless the Secretary of State in his discretion, after an investigation or upon a hearing, decides to reissue or issue such license or certificate.

Upon a third or subsequent conviction of a chauffeur for a violation of the provisions of section 287 or an ordinance, rule or regulation regulating speed of motor vehicles under section 288 the Secretary of State, upon the recommendation of the trial court, shall forthwith revoke the license of the person so convicted and no new license shall be issued to such person for at least 6 months after the date of such conviction nor thereafter except in the discretion of the said Secretary of State.

**Rhode Island—May Appeal to Governor**

The state board of public roads may, after due hearing upon not less than 3 days' notice in writing, suspend or revoke the license issued to any person under section seven of this chapter, for any cause which it may deem sufficient; but every applicant for a license whose application shall be refused by said board, and every licensee whose license shall be suspended or revoked by said board, may appeal to the superior court from such decision, refusal, or revocation, which court may affirm or over-rule the decision of said board. Every district court in this state shall in every case in which a person is convicted of a violation of any of the provisions of sections eleven, twelve, or thirteen of this chapter, within 10 days after such conviction therein, transmit notice thereof to the state board of public roads. Said courts may furnish to said board the details of all flagrant cases which may be heard before them, and they may make such recommendations to said board as to the suspension or revocation of the licenses of the parties defendant in such cases as they may deem proper.

**Vermont—Can Call Back Licenses**

The Secretary of State may suspend or revoke a license issued to a person under a provision of this chapter, after due hearing, for any cause which he may deem sufficient; and said secretary may, in his discretion, suspend the license of an operator or chauffeur and without hearing, and may order the license delivered to him whenever he has reason to believe that the holder thereof is an improper or incompetent person to operate an automobile, or motor vehicle, or is operating improperly so as to endanger the public.

# Stromberg Withdraws Appeal in Patent Suit

## Claims Case Is Already Decided—President of Zenith Co. States It Is Not Involved in Carbureter Suit

CHICAGO, ILL., March 31—The latest development in the suit of the Stromberg Motor Devices Co., Chicago, against the John A. Bender Co., of this city, a local dealer, is the recalling of the appeal on the part of the Stromberg attorney, which asked that the Zenith Carbureter Co., Detroit, maker of the Zenith carbureter, be made a party to the suit. This action was taken yesterday. The John A. Bender Co., agent for Keeton cars, which uses Zenith carbureters, has dismissed the attorneys which, it is said, represented the Zenith company, and by its own attorney, Franklin S. Catlin, has announced its intention of remaining out of the litigation.

The decision, which was handed down several weeks ago by Judge Sanborn, calls for a perpetual injunction, making the John A. Bender Co. an infringer of the Ahara patent, but this did not include the Zenith company. In order to make the Zenith company a party to the suit, the lawyer for the Stromberg company, Charles A. Brown, filed a motion asking that this be done. This motion was the one that was canceled yesterday.

At present the situation calls for payment of royalty by the John A. Bender Co. to the Stromberg company for all carbureters which it sells which are of Zenith make.

"The Zenith company, as shown by affidavits on file, maintained and conducted the defense, and this makes the Zenith company practically a party to the case, and the Zenith company will therefore be estopped, having had its day in court, from further contesting the validity of either the Ahara or Richards patents." This is the declaration made by Attorney Brown, of the Stromberg company.

Victor R. Heftler, president of the Zenith company, declares that his company is not involved in the Chicago case, and that it will await action on the part of the Stromberg company.

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### Pelletier Severs Maxwell Connection

DETROIT, MICH., March 30—E. LeRoy Pelletier has severed his connection as advertising counsel of the Maxwell Motor Co., following the taking over of the advertising of the concern by the Van Cleave Co., New York. Mr. Pelletier thus again severs his connections with Walter E. Flanders, now head of the Maxwell Company. Formerly he was connected with Mr. Flanders in the Flanders Motor Co., and earlier still with the E-M-F interests, which were taken over by the Studebaker Corp.

Mr. Pelletier still retains his advertising counsellorship of the Lozier Motor Co., and is also interested in the Flanders Electrics, Inc., of Pontiac, Mich., besides being connected with a prominent advertising agency of this city.

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### U. S. Steel to Manufacture Benzol

NEW YORK CITY, April 1—Four hundred thousand dollars have been appropriated by the United States Steel Corp. for the construction of a plant to manufacture benzol from by-products of the coke plant of the Carnegie Steel Co., at Farrell, Pa. The Steel Corporation has had this matter under consideration for a long time, and up to the present has been manufacturing coal tar and sulphate of ammonia from by-products at the Farrell plant. Benzol is being very widely used as a motor fuel in England, and the manufacture of it in American will add a new interest to motoring, particularly as this fuel can be satisfactorily used in motor trucks.

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### Readjustments in Hupp Officers

DETROIT, MICH., April 1—*Special Telegram.*—Recent readjustments of the duties of the officers of the Hupp Motor Car Co. have been made public by J. Walter Drake, president of the concern.

F. A. Harris, who was assistant general manager, has been made commercial manager, with greatly increased duties, while C. D. Hastings, who up to this time has had the title of secretary and general manager, relinquishes the latter, but is still the secretary of the company, besides acting in an advisory capacity. Later on in the summer he will take an extended foreign trip in the interests of the growing Hupmobile export business. Mr. Drake himself continues active supervision over general affairs of the company. From the engineering organization of the Hupp company Otto von Bachelle, who for the past year has been concerned with the production of a small six, has withdrawn, following the decision of the concern not to enter the six-cylinder field.

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### Studebaker Earnings Gain 43 Per Cent.

NEW YORK CITY, March 31—Strength in Studebaker stocks is understood to be a reflection of unusual earnings since January 1. Actual figures for January and February show cash receipts of $4,837,812, against $3,385,948 last year, a gain of 43 per cent. There were 5,720 automobiles sold during the 2 months, compared with 3,019 for January and February of 1913, an increase of 89 per cent.

Studebaker markets, including Canada, amounted to 16 per cent of the total Studebaker business.

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### Pinney a Chalmers Vice-President

DETROIT, MICH., April 1—*Special Telegram.*—H. H. Pinney, works manager of the Chalmers Motor Co., was elected vice-president at a recent meeting of the board of directors. Mr. Pinney retains his duties as works manager as well.

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### Von Herkomer, of Contest Fame, Dies

LONDON, March 31—Sir Hubert von Herkomer, the famous German artist, died today at the age of sixty-five. Sir Hubert was an ardent motorist. His endurance contests always proved of great value to the automobile world because of their long mileage and strict rules. One of the Herkomer prizes was a portrait of the winner, painted by himself. In 1907 a 1,140-mile endurance contest, which was the last tour under his name to be held, was run, in which were 198 machines furnished by Germany, Italy, France, Belgium, England, and Switzerland.

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NEW YORK CITY, April 1—At a meeting of the directors of the Motor Truck Club yesterday afternoon, C. E. Stone was elected general manager of the organization. E. L. Howland, who has heretofore handled both the duties of secretary and general manager of the club, still remains as secretary. Mr. Stone was treasurer of the club last year. In accepting the salaried position he resigns as one of the directors and as chairman of the membership committee. The club will continue its offices at 1790 Broadway.

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### Walpole Property to Be Sold

BOSTON, MASS., April 1—Judge Dodge, in the United States District Court, has authorized the sale of the property of the Walpole Tire & Rubber Co. The sale must take place within 6 weeks, the upset price being $1,150,000. The sale will be conducted by the receivers, Harris and Fisher.

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### New Shock Absorber Co. in Mt. Vernon

NEW YORK CITY, April 1—The Volute Spring Shock Absorber Co., of Mt. Vernon, has been formed with a capital of $100,000, to manufacture a shock absorber to be interposed between upper and lower parts of the spring. The incorporators are J. G. Rock, inventor; M. D. Stile, and E. M. Benford, all of Mt. Vernon. This shock absorber uses a special double volute spring in combination with air and a hydraulic system. The combination of air, spring, and oil is something new. The absorbers are attached by replacing the spring shackles. They range in size from Ford sizes to those for trucks. About 100 sets have been in use on small cars since last fall. They will range in price from $12 up to $35 a pair. A factory will be established in the near future in Mt. Vernon.

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NEW YORK CITY, March 28—At a meeting of the Board of Directors of the Automobile Trade Association of New York State held in the offices of the Association in the Hotel Woodward on Friday, March 26, 1914, Mr. R. H. Johnston, General Manager of the White Company of New York and President of the Automobile Dealers Association, was elected president to succeed Mr. Arthur M. Day, who recently severed his connection with the automobile industry. The other officers of the Association are Mr. C. D. Hakes of Albany, vice-president, Mr. Ralph E. Brown of Rochester, treasurer, and Mr. Charles A. Stewart, secretary and general manager.

# Factory Miscellany

**FORD'S Proposed London Plant**—The Ford Motor Co. will construct in London, Ont., another Canadian branch in the near future. A Detroit architect is now working on the plans for the proposed new building which is to be a four-story structure and modern in every detail. Later in the week several officials from the Detroit factory of the Ford Motor Co. are expected in London to look over three sites which have been bonded by a real estate dealer on behalf of the Ford concern. The proposed sites include a property on William street near the Grand Trunk tracks, another on Maitland street and a third on York street owned by John Mann & Sons. The Ford company's lease on its present quarters on the to-be Federal Square, owned by the city of London, will expire next November and it has secured permission to use one of the Western Fair buildings for storage purposes. At the present time the Ford company has two factories, one in Detroit to supply the American business and the other in Walkerville, Ontario, Can. The Walkerville factory, it is stated, cannot keep up with demands that are being made upon it and the proposed plant in London will be an auxiliary, where cars may be assembled and repairs kept and made. London right now is the distributing center for this district and the increasing business here necessitates for this purpose alone the securing of much larger and more commodious quarters for the Ford business.

**May Purchase Ingersoll Plant**—It is considered probable that Wilson & Short, of Detroit, Mich., will purchase the Standish Mfg. Co.'s plant at Ingersoll, Ont., and install equipment for manufacturing automobile specialties.

**National Tire Co. Will Build**—Architects have been engaged to prepare plans and specifications for a plant for the National Tire & Rubber Co., East Palestine, O. The contract has been awarded to the Security Construction company of Youngstown, O.

**Midgley Purchases Lancaster Plant**—Harry Davis, president of the Midgley Tire and Rubber Co., has closed a deal for the purchase of the plant of the Flint Glass Company at Lancaster, O., which will be used for a tire factory as soon as it is remodeled and machinery installed.

**Contract to Harrisburg Co.**—The Harrisburg, Pa., Pipe & Pipe Bending Co. has received specifications for about 100,000 pieces of steel to be converted into automobile rims for a well-known car. The company is working on a large contract with the Linde Air Products Co., New York City.

**Garage Added to Factory**—The Northwestern Mfg. Co. of Fort Atkinson, Wis., one of the largest builders of carriages and wagons in Wisconsin, has set apart a large part of its metal-working shop as a garage and repair shop and is organizing an extensive motor car service for owners. A specialty is being made of rebuilding and building bodies.

## The Automobile Calendar

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| April 1-4 | Elgin, Ill., Automobile Show, Elgin Auto Dealers' Assn. |
| April 7, 8, 9 | New York City, S. A. E., Standards Committee Meeting. |
| April 8-11 | York, Pa., Automobile Show, Coliseum. |
| April 9-15 | Manchester, N. H., Automobile Show. |
| April 12-19 | Prague, Austria, Eleventh Annual International Auto Exhibition, Royal Tiergarten. |
| April 21 | New York City, S. A. E., Research Division Meeting. |
| May 5 | New York City, S. A. E., Electrical Equipment Division Meeting. |
| May 12 | New York City, S. A. E., Ball and Roller Bearings Division Meeting. |
| May 14 | New York City, S. A. E., Motor Testing Division Meeting. |
| May 25-26 | Palermo, Sicily, Targa Florio, 700-Mile Race. |
| May 30 | Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway. |
| June 1 | Palermo, Sicily, Coupe Florio, 279-Mile Race. |
| June 17-18 | Fayette Co., Pa., Second Annual Hill Climb, National Pike. |
| June 18 | Uniontown, Pa., Hill Climb, Auto Club of Fayette Co. |
| June 23-26 | S. A. E. Summer Meeting, Cape May, N. J., Cape May Hotel. |
| June 24-26 | Chicago, Ill., Seventh Annual Meeting of Nat. Gas Engine Assn. |
| June 30 | London, Eng., Fourth International Rubber and Allied Industries Congress. |
| July 3-4 | Tacoma, Wash., Road Races, Tacoma Carnival Assn. |
| July 4 | Sioux City, Iowa, 300-Mile Race, Sioux City Auto Club and Speedway Assn. |
| July 4 | Lyons, France, French Grand Prix. |
| July 13-14 | Seattle, Wash., Track Races, Seattle Speedway Assn. |
| July 25-26 | Belgium Grand Prix Road Races. |
| Aug. 21-22 | Chicago, Ill., Elgin Road Races, Chicago Automobile Club. |
| Sept. 9 | Corona, Cal., Road Race, Corona Auto Assn. |
| Sept. 26-Oct. 6 | Berlin, Germany, Automobile Show. |
| Oct. 1 | Paris, France, Kerosene Motor Competition. |
| Oct. 19-26 | Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A. |
| November | El Paso, Tex., Phoenix Road Race, El Paso Auto Club. |
| November 8-11 | Shreveport, La., Track Meet, Shreveport Auto Club. |

**Paige Plant Has Visitors' Guide**—Visitors to the big new factory of the Paige-Detroit M. C. Co., Detroit, Mich., will not have to wander aimlessly through all the different departments and leave with a bewildered impression of myriads of belts, machines and hundreds of scurrying men. A guide will be placed at their service. He will follow a carefully planned route, showing and explaining in an intelligent manner the various machines, etc.

**Will Manufacture Governors**—Benjamin G. Kramer, president of the B. G. Kramer Co., 243 Lake street, Milwaukee, Wis., manufacturing machinery specialties, has organized the Kramer Governor Co., capital $25,000, to manufacture governors for motor trucks. John H. Hurley and Max Gessler are associated with Mr. Kramer in the new venture. Headquarters will be established at once in the present Kramer works on Lake street. A large production is planned.

**Rotary Valve Co. Ready for Business**—The Augustine Rotary Valve Motor Co., Marshfield, Wis., is completing exhaustive tests of its product and is practically ready to begin the manufacture of the engine on a large scale for the motor car manufacturing trade. The company was organized with $25,000 capital several months ago to develop the invention of J. L. Augustine, a well-known Marshfield inventor and mechanic, and has already built ten experimental motors. Slight changes in design are yet to be made, but by April 1 the concern expects to be ready to make deliveries.

**Crescent in Plant**—Within a week after the company was organized here, the Crescent Automobile Co., St. Louis, Mo., opened its factory. The plant is located at Main and St. George streets in a leased building. The company will sell cars that will retail for between $900 and $1,000. The company's product will be an assembled machine, the parts being bought outside and the bodies made in St. Louis. The first car will be out the shop, it is said, by April 15. The line is to consist of a roadster and a five-passenger touring car, and will be known as the "Crescent."

**Manufactures Radiators in Cleveland**—The Cleveland Auto Radiator Co., Cleveland, O., incorporated for $20,000, is to build a plant in that city for the manufacture of radiators under patents held by the company. William Schoellkopf, a Cleveland automobile builder, it is claimed, has perfected a radiator upon a new principle that removes the dangers of both overheating the engine and the freezing of the radiator. The incorporators are, besides the inventor, J. S. Dickle, F. G. Carpenter and F. E. Dellenbaugh. The radiator, it is stated, is now under test by the Ford Motor Car Company and other manufacturers.

**Peters Co.'s Cleveland Plant**—The Peters Machine & Mfg. Co., Cleveland, O., makers of transmissions, front and rear axles and steering gears, will erect a large factory at 7320 Madison avenue. The building will be 80 by 209 feet. It will be one story, of brick and steel, but the foundation will be so constructed that a second story can be added. The company was started 7 years ago by Fred W. Peters. He rented space in the Whitney power block and with one machine began the manufacture of automobile parts. His factory today operates ninety men and sixty machines with a night and day force. The officers are president, T. J. Smith; vice-president, F. W. Peters; secretary and treasurer, J. H. Wills.

# The Week in  the Industry

## Motor Men in New Roles

**MILES Sails for Europe**—S. A. Miles, of the National Automobile Chamber of Commerce, accompanied by Mrs. Miles, left on March 28 on the steamer Olympic for a 2-months' journey through Europe by automobile. They took with them an American car, and will cover some of the principal places in England, Scotland and Wales, with a short trip in France. While abroad, Mr. Miles will visit some of the automobile factories in England and on the Continent.

**Goodrich in New Capacity**—F. M. Goodrich has recently been appointed manager of the Tire & Oil Co., San Francisco, Cal.

**Maus Batavia Rubber Manager**—J. B. Maus has been appointed eastern district manager for the Batavia Rubber Co., Batavia, N. Y.

**Lyons Moreland Truck Manager**—G. V. Lyons has been appointed manager of the San Francisco, Cal., branch of the Moreland Motor Truck Co.

**Sohl McGraw Tire Manager**—The McGraw Tire & Rubber Co. has opened a branch in Atlanta, Ga., with G. A. Sohl as manager. The branch is at 227 Peachtree street.

**McAvoy Dies**—Anthony McAvoy, Racine, Wis., president of the Wisconsin Auto Top Co., Racine, and the Racine File Co., Racine, died in that city on March 19, aged 68 years.

**Woodill Sales Manager**—Gilbert Woodill has joined the W. K. Cowan Co., Los Angeles, Cal., as sales manager. This company distributes Jeffery cars throughout southern California.

**Brown with Mitchell**—H. R. Brown has resigned as western division sales manager of the Thomas B. Jeffery Co., Kenosha, Wis., to identify himself with the Mitchell-Lewis Motor Co., Racine, Wis.

**Busby with Ferro Co.**—E. B. Busby, recent sales manager of the Anderson Forge & Machine Co., Detroit, Mich., has become general sales manager of the Ferro Machine & Foundry Co., Cleveland, O.

**Yule Passes Away**—W. L. Yule, one of the founders and principal stockholders in the Badger Brass Mfg. Co., Kenosha, Wis., died at Los Angeles, Cal., recently, aged 51 years. He had been an invalid for 2 years.

**Jordan Firestone Office Manager**—John Jordan is now office manager of the Firestone tire branch in New York City. He was for 7 years with the Diamond company and then for 3 years with the Century Tire Company.

**Monson Kellogg Branch Manager**—C. S. Monson, who recently opened manufacturers' representative offices in Detroit, Mich., has become branch manager in Detroit, of the Kellogg Mfg. Co., Rochester. This company manufactures automobile and tire pumps.

**Burke P. C. & K. Manager**—W. W. Burke has been engaged as manager for the branch and service station for the sale and care of the Premier, Lewis and Briscoe, which Partridge, Clark & Kerrigan have established at 1176 Bedford avenue, Brooklyn, N. Y.

**Simms Arrives in this Country**—F. R. Simms, who left London on March 21, arrived in this country on the Lusitania. He is paying his annual visit of inspection to the American plant of the Simms Motor Units, Ltd. This plant is in Bloomfield, N. J.

**Revel Promoted**—O. C. Revel, who has been manager of the Indianapolis, Ind., sales branch of the Diamond Tire Co., has been promoted to assistant district manager at Chicago, Ill. He has been succeeded at Indianapolis by H. D. Bentley, who has been with the company at Chicago.

**Kempton Resigns from Remy**—P. E. Kempton has severed his connection with the Remy Electric Co., for which he has been acting as coast manager for the past 2 years, and is at present the head of the Motor Equipment and Specialty Co., with headquarters at San Francisco, Cal.

**Gragg with Wausau Co.**—W. R. Gragg, recently associated with the sales department of the Packard M. C. Co., Chicago, Ill., has become associated with the J. H. Hall Automobile Co., Wausau, Wis., as sales manager. The company is one of the largest retail dealers in Northern Wisconsin.

**Rutherford Gets Promotion**—W. O. Rutherford has been appointed assistant general sales manager of the B. F. Goodrich Co., New York City. For the past 4 years he has been assistant to H. E. Raymond, second vice-president and general sales manager. He started with the Goodrich in the Denver, Col., branch, being manager there, and then for 10 years was manager of the Buffalo, N. Y., branch.

**Van Dever Returning to U. S.**—L. C. Van Dever, assistant to the general manager of the Willys-Overland Automobile Co., is a passenger on the Mauretania, returning to this country from London. Before leaving he was interviewed, stating that his company had shipped 28,000 automobiles from July 1 last year to March 11. He also stated that his company had been averaging about 223 cars a week.

## Garage and Dealers' Field

**Hupp Year Book Out**—The Hupp M. C. Co., Detroit, Mich., has sent out its year book. This book will prove an invaluable aid and great benefit to everyone who expects to own an automobile.

**Philadelphia Co. Moves**—The Detroiter-Philadelphia Co., Philadelphia, Pa., has removed from 2033 Market street to enlarged quarters at 506 and 508 north Broad street. The company also maintains a service department at 1422 Fairmount avenue.

**New Buffalo Bldg.**—Jos. Strauss & Son, Buffalo, N. Y., will occupy an entire new building in the near future. This building has five floors, also basement, at 215 East Genesee street, near Michigan, that city. This company deals in automobile supplies.

**Issues "Safety First" Book**—The B. F. Goodrich Co., Akron, O., has recently issued a booklet, "Rules of the Road." The purpose is to help further the Safety First movement by putting valuable hints in such concrete shape that they can be quickly mastered by the man behind the wheel.

**School Boy Builds Cyclecar**—Chalis Robinson, a Los Angeles high school student, has recently completed a cyclecar embodying several clever ideas and principles not found in the larger machines. The machine steers with the back wheels, while the power is transmitted to the one front wheel by a direct drive. It has a speed of 35 miles an hour.

**Cleveland's $125,000 Garage**—A $125,000 garage and salesroom is to be built in Cleveland, O., for H. J. Latimer, 5700 Euclid avenue, preliminary plans for which are being made by Architect E. F. Gibbons, 1900 Euclid building. The office and salesroom building will be 60 by 75 feet, two stories, and garage 75 by 360 feet, one story, both buildings to be constructed of brick, reinforced concrete and steel.

**Falls Rubber Branch in Cleveland**—The Falls Rubber Co., Cuyahoga Falls, has announced that a factory branch will be maintained in Cleveland, O., succeeding the F. J. Allen Co., 2001 Euclid avenue, which concern has been the local representative of the Falls tire for the past year. John Welton, Jr., of Akron, will have personal supervision of the new branch, but F. J. Allen and Frank T. Williams, of the former distributing company, will be associated with Mr. Welton.

**Autocar's Baltimore Showroom Opened**—The new offices, showrooms and service station of the Autocar Sales & Service Co., 1311 Cathedral street, Baltimore, Md., will be ready for occupancy about April 1. This company is the Baltimore branch of the Autocar company handling the Autocar trucks. The Foss-Hughes Co. will also use part of the new building as a service station for the Pierce-Arrow car which the latter company represents in this section. They will continue their office and salesrooms at 810 North Charles street.

**Studebaker Car's Novel Use**—The United States Vending Machine Co., east 93 street, Cleveland, O., recently moved its factory into larger quarters and having all the machinery placed was patiently waiting the installation of the new power plant, which had been delayed. Being unable to begin operations without power it hit upon the novel arrangement of operating the line shafts with a Studebaker 20. In this manner most of the machinery actually needed for operation of the entire plant was set into movement.

# Accessories for the Automobilist

**FARNSWORTH Gas Generator**—Absolute vaporization of the gasoline fuel, and therefore more perfect carburetion, is attained, in the Farnsworth Gas Generator, which has just been brought out, by heating the charge as it comes from the carbureter to a temperature of several hundred degrees.

The generator is placed between the carbureter and the intake manifold and is heated by the exhaust gas. It consists of a brass cylinder, about 3 inches in diameter and 6 inches long, containing a number of small brass tubes through which the exhaust gases circulate. Around these tubes the charge on its way from the carbureter to the cylinders passes and is heated up to such a high temperature that all the gasoline is completely vaporized. The exhaust gases are conveyed to the generator by a flexible tube 1.25 inches in diameter and from the generator the gases escape to the atmosphere.

The generator has been tested by Professor Sibley, of the Mechanical Engineering Department of the University of California, and he reports that the percentage of carbon completely burned was raised to 98 per cent., with its use as against 80 per cent. on the same motor when not equipped with the gas generator. The generator is made by the Distillate Motor Equipment Co., 1002 Monadnock Building, San Francisco, Cal.

**U. S. Tire Pump**—The illustration, Fig. 1, shows a new tire pump suitable for both public and private garages, which is sold by the U. S. Electrical Tool Co., Cincinnati, O.

It is simple and compact in its construction, and being mounted on a truck it can be easily taken around the garage or out to the curb. The pump is air cooled and is driven by a 25-horsepower Westinghouse motor. The pump discharges into a tank 12 inches long by 6 inches in diameter and in addition to acting as a reservoir it prevents condensation of oil from entering and injuring the tire. It is stated that a 35 by 4 inch tire can be inflated to 70 pounds in 1.5 minutes.

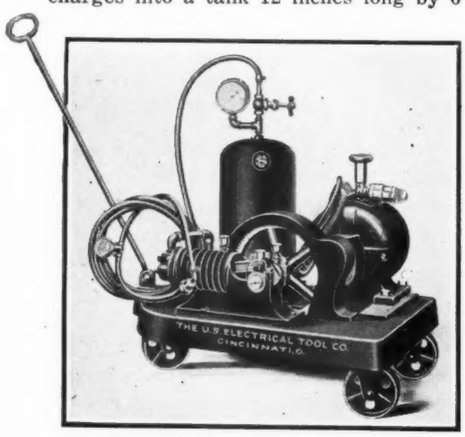


Fig. 1—U. S. garage tire pump

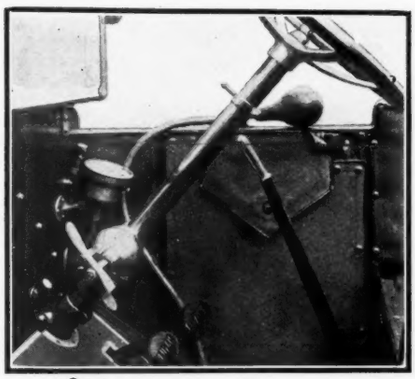

Fig. 2—Auxiliary pedal steering device installed on a car

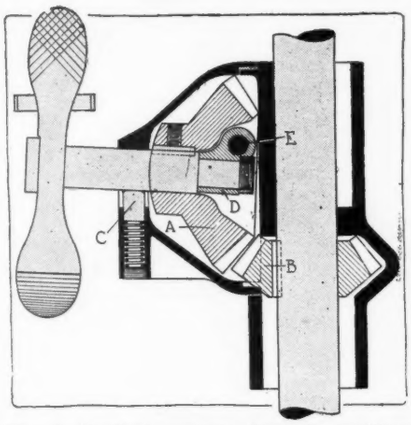


Fig. 3—Vertical section through auxiliary pedal steering mechanism

**Auxiliary Pedal Steering Device**—Steering by means of the foot is made possible by a device, Fig. 2, invented by B. T. Steiner and H. B. White of the Gilliam Mfg. Co., Canton O. It is intended to supplement the steering wheel and consists of a pedal and bevel gear pair that acts on the steering gear. By rocking the pedal with the foot the car can be controlled just as easily as with the hands. Fig. 3 shows a vertical section through the device. The pedal is connected to a bevel gear A which can be thrown into mesh with the gear B. The latter gear is keyed to the rod that runs through the steering post. Thus when the gears are in mesh the motion of the pedal is transmitted to the steering mechanism, the same as when the wheel is used. Ordinarily these gears are held out of contact by the spring and plunger C, but when the weight of the foot is applied to the pedal the gear A, whose bearing D is pivoted at E, is brought into mesh.

Many interesting advantages are claimed for this device. It can be used to rest the arms on a long drive or can be employed when one requires the use of both hands in adjusting one's hat, glasses or goggles. In winter driving the hands can be kept in the overcoat pockets.

**Pioneer Ford Painting Outfit**—The Northwestern Chemical Co., Marietta, O., is making a painting outfit for the use of the Ford owner. Seven colors are offered—red, blue, green, orange, tan, gray and black. The complete outfit for painting the car the latter color is sold for $5, while a choice of the others is offered for $5.75. Detailed instructions are given for refinishing the car surface.

**Ford Aluminum Heel Plate**—An interesting accessory for Ford cars to prevent the wearing of the rubber matting directly under the operator's feet is made by the Metallic Automobile Matting Co., Rochester, N. Y. The heel plate, Fig. 4, is attached by cutting four slits in the matting to correspond with the metal projections on the four corners of the plate and then slipping these projections through the slits and bending them over.

**Cameron Ford Wire Wheels**—A detachable and interchangeable wire wheel, Fig. 5, for Ford cars has been brought out by the Cameron Wire Wheel Co., Detroit, Mich. These wheels are being furnished in sets of five and are laced in a special manner. With this construction the tread of the wire wheels is the same as the wooden ones, which is an advantage on rough roads as there is less danger of the wheels catching in the ruts. It is said that the lacing is easily cleaned. The change from wood to wire wheels can be made in one hour's time.

**C-Well Rear Sight Auto Mirror**—The Standard Spinning & Stamping Co., Toledo, O., is making a simple mirror, Fig. 9, for attachment to the windshield of Ford cars that is designed to give the op-

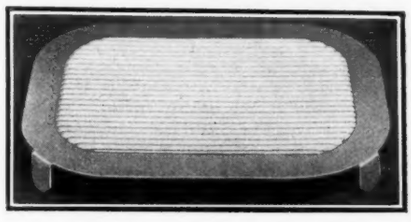

Fig. 4—Ford aluminum heel plate

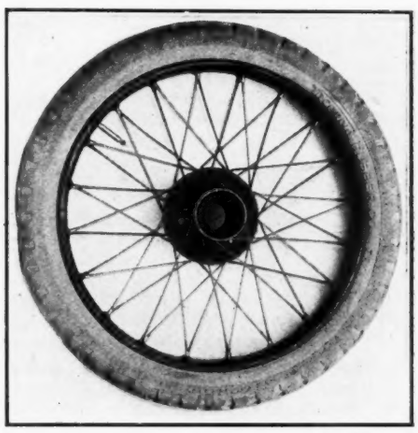

Fig. 5—Cameron Ford wire wheel

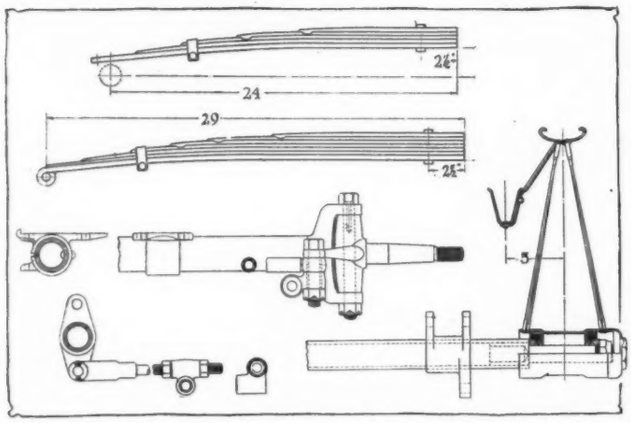


Fig. 6—Bicar cycle parts. Top—Quarter elliptic springs. Middle—Front axle construction. Bottom—Radius rod design. Right—Rear axle and wire wheel construction

erator a view of the road in the rear. It is 6 inches in diameter and is offered for $2 with a black enamel finish and $3 with nickel finish.

**Standard Signal Lamp**—A lamp, Fig. 8, that shows the man in the rear what the driver of the car ahead intends to do is manufactured by the Standard Signal Lamp Co., Bridgeport, Conn. The lamp is divided into three compartments, each of which contains a small tungsten bulb. The first compartment has a red glass and has the word "left" on its surface; the next compartment is white and has the word "stop," while the right one is green and has the word "right." The flashing of the bulb in any one of these compartments indicates when the driver intends to turn to the right, left or to stop. The signal is operated by a simple switch. It retails at $10.

**Kum-a-Long**—The difficulty experienced by the average motorist in putting on tire chains can be avoided by the use of a simple device put out by the Schaefer Sales Corp., Detroit, Mich. It is known as the Kum-a-Long, Fig. 11, and consists of a piece of heavy wire bent into a shape resembling a horseshoe. This piece of wire is slipped around the felloe of the wheel and then the tire chain is hooked to the ends of the device, after which the wheel is rotated and the chain attached. The Kum-a-Long simply holds one end of the chain while it is attached, and thus leaves both hands free to put the chain in place. A pair costs 50 cents.

**Tel-Tale Gasoline Gauge**—A simple device, Fig. 12, that shows the level of gasoline in the tank is made by the Schaefer Sales Corp., Detroit, Mich. The indicating dial is divided into quarters, and the pointer is operated by a float which slides on a strip that is spiral in form. The upper end of this strip is attached to the pointer, and the twist to the metal strip is uniform so that the position of the float gives a correct indication of the amount of fuel in the tank.

The Tel-Tale does not require any special fitting for its installation, the lower part of the housing containing the gauge being threaded to take the place of the filler cap. The filler cap itself is screwed into the opening provided below the gauge dial. The price is $2.50.

**Rayfield Strainer Trap**—The Findeisen & Kropf Mfg. Co., Chicago, Ill., has put on the market a gasoline trap and strainer that is designed to remove all water and dirt from the fuel.

As shown in Fig. 7, the Rayfield strainer trap, as it is called, consists of a large settling chamber at the top of which is a screen. The gasoline enters at the left and most of the dirt and all of the water settle in the bottom of the bowl, while any light foreign matter is caught by the screen at the top of the chamber.

Water and sediment can be drained out at the bottom, while the strainer can be cleaned by loosening the yoke holding the cover plate, after which the strainer can be removed. The trap is 5 inches high and 2.5 inches wide and is furnished as shown for $2.50. Just above the drain cock is an arm or brace by which the trap can be fastened to any convenient place on the car. An arrow indicates which way the strainer should be installed.

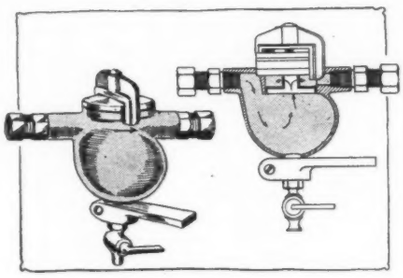

Fig. 7—Rayfield strainer trap

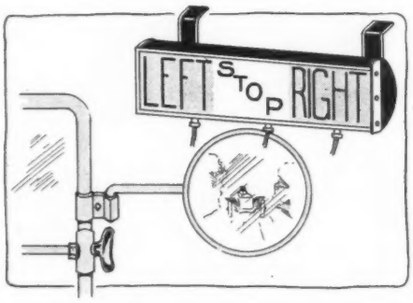


Fig. 8—Top—Standard signal lamp

Fig. 9—C-Well rear sight auto mirror

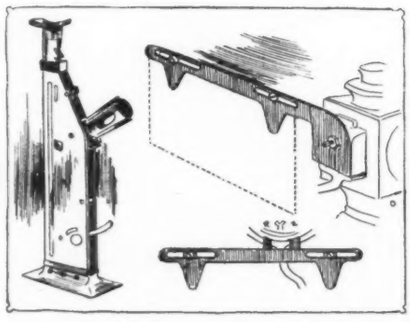

Fig. 10—All-steel Ford specialties

**Bicar Cyclecar Parts**—Front and rear axles, V-belts, wheels and springs for cyclecars are manufactured by the Engineering Equipment Co., Indianapolis, Ind. These are illustrated in Fig. 6.

The Bicar front axle follows automobile design. It has a tie rod back of the axle. The yokes and knuckles are drop forged and the king pins are tapped for grease cups. Pads, 1.5 inches wide, for either quarter or half-elliptic springs are furnished.

The rear axle is for use in connection with belt drive, and can be used with either cantilever or quarter elliptic springs. Radius rods are provided, these having swivel joints at the front. Ample adjustment to allow for the tightening of the belt is provided. Bicar axles are made for 36 and 42-inch treads and are designed for cars weighing 600 to 700 pounds empty.

The cyclecar wheels made by this concern are especially designed for this work and are provided with adjustable ball bearings. The spokes are laced tangentially and the wheels take 28 by 2.75 or 3-inch tires. The rear wheels are equipped with deep pulleys that are attached to the wheels by nine lugs made of pressed steel.

The springs are quarter elliptics and are made in two sizes, 24 and 29 inches, the front ones being designed for a load of 220 pounds and the rear for 250 pounds each.

Bicar belts are made 1.125 inches in width and are called non-stretch belts because two steel cables are braided into grooves between the plies of leather. These cables are braided and have a cotton core to reduce friction.

**All-Steel Ford Specialties**—Three new Ford accessories, Fig. 10, have been brought out by the Walker-Moore Mfg. Co., Racine, Wis. These are an all-steel lifting jack, and front and rear license brackets. The jack is a light, strong, compact ratchet device that is suitable for cars of 2,000 pounds or under. The various parts are made from cold rolled steel. The base and standard, the rack bar and cap are electrically spot welded and the pawls are case hardened. The height is 10 inches, weight 2.5 pounds, the lift 5 inches and the price $1.25.

The license brackets are made in one piece, the front being designed to hang from the lamp fork and being fastened to the fork by two bolts, while the rear one is attached to the rear lamp holder with the same set screw that holds the lamp.

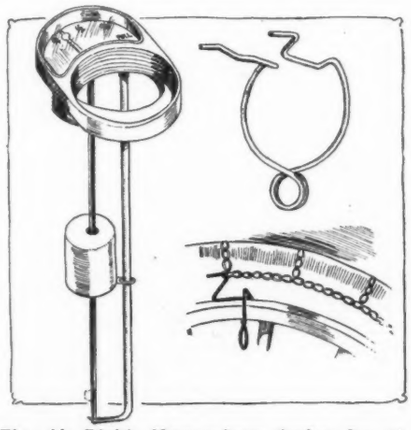

Fig. 11—Right—Kum-a-long device for attaching chains

Fig. 12—Left—Tel-Tale gasoline gauge